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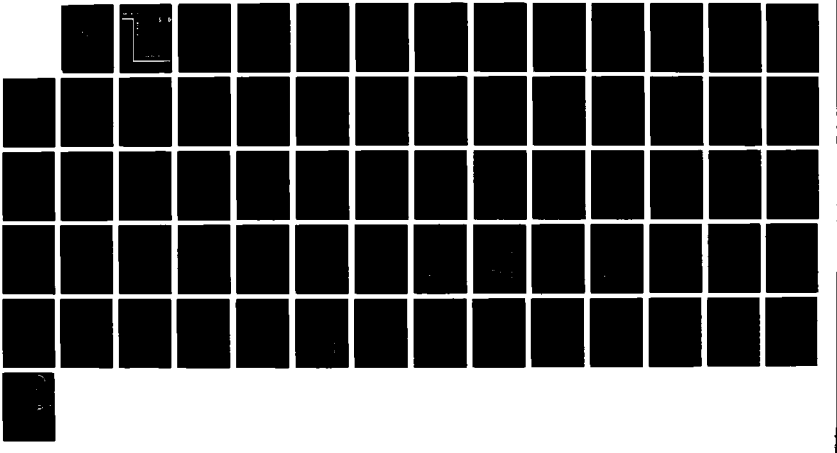

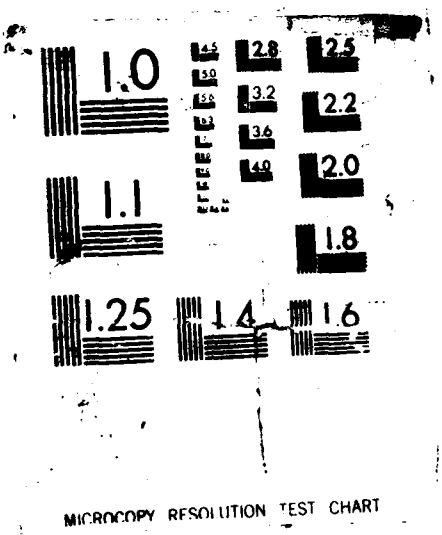
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AIR FORCE HUMAN RESOURCES LABORATORY

TASK TRAINING EMPHASIS FOR DETERMINING TRAINING PRIORITY

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August 1987

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AIR FORCE SYSTEMS COMMAND
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This paper has been reviewed and is approved for publication.

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Instructional System Development (ISD), a complex interactive training model employed by the Air Training Command, guides the development and revision of technical training courses. The present effort focused on the first two steps of the model -- "analyze system requirements" and "define education and training requirements." Job inventories were administered to incumbents and supervisors in 18 Air Force specialties (AFSs). Incumbents checked and rated the relative time spent on tasks performed in their current jobs. Supervisors also rated the tasks on several different task factors, including a new factor called "Recommended Training Emphasis." Acceptable levels of interrater agreement among supervisors on all task factors were obtained. Further analyses included the development of separate regression equations for the 18 AFSs to predict Recommended Training Emphasis, and the testing of a number of "average" regression equations for various aggregates of specialties, to determine their generalizability and utility.

Results showed that regression equations for each specialty demonstrated high predictive efficiency and that two sets of "averaged" regression equations were required, as a minimum, to predict training emphasis (Continued)

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recommendations for tasks in all 18 specialties. These research findings have led to the conclusion that the criterion, Recommended Training Emphasis, should be collected and not estimated from other task factor data. This conclusion is based on the findings that: (a) Recommended Training Emphasis ratings can be reliably collected, (b) the ratings are construct valid in terms of ISD theory, and (c) it is more economical to collect Recommended Training Emphasis ratings than to estimate them.

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TASK TRAINING EMPHASIS FOR DETERMINING TRAINING PRIORITY

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This publication is primarily a working paper. It is published solely to document work performed.

SUMMARY

The objectives of this effort were to develop and validate procedures for establishing formal technical training priorities for job tasks for entry-level airmen and to develop computer software which merges task training priorities with other occupational information and displays the results in a printed report.

Instructional System Development (ISD), a complex interactive training model employed by the Air Training Command, guides the development and revision of technical training courses. The present research focused on the first two steps of the model -- "analyze system requirements" and "define education and training requirements." Prior to this effort, tasks listed in job inventory booklets were analyzed in terms of Percent Members Performing or Task Difficulty data; however, no valid way of listing tasks in order of training priority existed. Given that Air Force trainers have limited training resources, it is important that they allocate those resources to tasks that have the highest training priority.

Job inventories were administered to incumbents and supervisors in 18 Air Force enlisted specialties. In the job inventories, incumbents checked and rated the relative amount of time they spent performing tasks in their current jobs. Supervisors also rated the tasks on several different task factors, including Task Difficulty, Probable Consequences of Inadequate Performance, Task Delay Tolerance, and Recommended Training Emphasis (i.e., recommendation for entry-level formal training). The ratings on tasks recommended for entry-level formal training were used as the criterion to be predicted from the other task factors.

Results showed that regression equations for each specialty demonstrated high predictive efficiency and that two sets of "averaged" regression equations were required, as a minimum, to predict training emphasis recommendations for tasks in all 18 specialties.

These research findings have led to the conclusion that the criterion, Recommended Training Emphasis, should be collected directly from supervisors and not estimated from other task factor data. This conclusion is based on the findings that: (a) Recommended Training Emphasis ratings can be reliably collected, (b) the ratings are construct valid in terms of ISD theory, and (c) it is more economical to collect Recommended Training Emphasis ratings than to estimate them. Several computer products that merge Recommended Training Emphasis ratings with other occupational information were developed to assist training designers. It is recommended that Recommended Training Emphasis ratings be used to select tasks for formal initial skills training courses.

PREFACE

This research was initiated under Work Unit 2313T106, Stability of the Task Training Priority Equation, and was completed under Work Unit 77191911, Task Oriented Measurement Technologies. The present effort represents a portion of the Laboratory's Force Acquisition and Distribution System thrust. The reader should note that the work described in this paper was completed some time ago. Thus, the research reported here constitutes early efforts in the area of training priority determination.

The authors wish to extend their appreciation to Dr. Raymond Christal, Mr. Johnny Weissmuller, Sgt Michael Thew, Sq Ldr David Thompson (RAAF), and Dr. David Vaughan for their suggestions and assistance in the conduct of this effort. Also, the authors would like to thank Lt Richard Brown for constructing the tables in this document. In addition, invaluable comments and recommendations were provided by Ms. Jacobina Skinner, Mr. Wayne Archer, Capt Hector Acosta, Mr. Jim Earles, and Lt Kevin Berning.

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I. INTRODUCTION

Background

The amount of initial skills technical training provided by the Air Training Command (ATC) is enormous. Approximately 55,000 airmen attend at least one of the 335 initial skills courses each year. The fact that approximately 15,000 airmen are in initial skills training courses at any one time, together with the fact that the mean course length for these courses is about 11.5 weeks, indicates the magnitude of the initial skills training system. The dollar cost of this training is difficult to assess. Irrelevant training can be expensive, in terms of both training system involvement and non-productive use of manpower. Therefore, the development of an effective system for determining job-related training requirements is a principal objective of the training community.

Important to the determination of initial skills training requirements is deciding which job tasks should be trained and to what degree. The Air Force's occupational survey program provides task data which are useful for determining training requirements. The main purpose of the present effort was to simplify the process of using occupational survey data to rank-order tasks for training entry-level airmen.

Instructional System Development (ISD)

ATC currently employs Instructional System Development (ISD), a complex five-step feedback and interaction loop model, to guide the development and revision of technical training courses. The five steps comprising the model are:

1. Analyze system requirements.
2. Define education and training requirements.
3. Develop objectives and tests.
4. Plan, develop, and validate instruction.
5. Conduct and evaluate instruction.

The product of the first step of ISD is "a list of all job tasks, the equipment or materials involved with each task, the conditions under which the tasks must be done, and the standards that must be met" (AFM 50-2, p. 1-2). The product of the second step is the definition of education and training requirements. Instructional objectives and test items to measure student attainment of the objectives are developed in the third step of ISD. In step 4, sequencing of learning activities, selection of instructional methods, and tryouts of the course are accomplished. In step 5, instruction is conducted, and instruction and graduate job performance are evaluated. Results of the last step feed directly into step 1 of ISD; thus, the model is a closed loop. In summary, ISD is "a process which allows for the orderly development of change of Air Force education and training programs" (AFM 50-2, p. 1-5).

The research presented in this paper focuses on a process to analyze and define training requirements; i.e., steps 1 and 2 of the ISD model. This paper does not address the remaining steps, although they are affected by the results.

Occupational Survey Methodology

The general approach used to accomplish the first two steps in ISD involves identifying job tasks and using information about various characteristics of the tasks to determine education and training requirements. Table 1 identifies the task factors/characteristics which have been recommended by various authors for use in selecting tasks for training.

Table 1. Occupational Data Proposed for Use in Technical Training Development

	Proposed by:					
Task Factors	Chamberlain (1964)	Carpenter (1970)	Christal (1970)	Ammerman (1977)	AFP 50-58 (1978)	AFM 50-2 (1979)
Percent Performing	Yes	Yes	Yes	Yes	Yes	Yes
Number Performing	-	-	-	-	Yes	Yes
Percent Time Spent	Yes	-	-	-	-	-
Frequency of Performance						Yes
Time to Initial Performance	Yes	-	Yes	-	-	-
Diversity of Performance	-	Yes	-	-	-	-
Part of the Position	-	-	-	Yes	-	-
Criticality	Yes	Yes	-	-	Yes	Yes
Cost Effectiveness of OJT	-	Yes	Yes	-	-	-
Difficulty	Yes	-	-	-	Yes	Yes
Task Guidance	Yes	-	-	-	-	-
Hazard	-	Yes	-	-	-	-
Complexity	-	Yes	-	-	-	-
Perishability of Skill	-	-	Yes	-	-	-
Frequency of Inadequate Performance	-	-	Yes	-	-	-
Consequences of Inadequate Performance	-	-	Yes	-	Yes	-
Probability of Emergency Performance	-	Yes	-	-	-	-
Transferability of Skill	-	-	Yes	-	-	-
Trainability of Skill	-	-	Yes	-	-	-
Desired Percent Performing	-	-	-	Yes	-	-
Desired Part of Job	-	-	-	Yes	-	-
Recommended Learning Location	-	-	-	Yes	-	-
Task Delay Tolerance	-	-	-	-	Yes	-

Note. For additional occupational data scales, see Ammerman (1977); Fruchter, Morin, & Archer (1963); and Morsh & Archer (1967).

Occupational survey methodology (Christal, 1974) is routinely used in the Air Force to gather data about job tasks. First, a list is constructed of all tasks that individuals in a specific occupation might perform. Then job incumbents review this task list, checking off tasks they perform and rating their relative time spent on these tasks. From these data, percentages of incumbents performing each task and the average percent time spent on each task are routinely determined. Using the same task list, data concerning other task characteristics may be gathered by having subject-matter experts rate tasks. Task Difficulty data, for example, are routinely gathered in this manner.

Occupational survey methodology has been shown to provide valid data about job tasks (Stacy, Thompson, & Thomson, 1977). As may be seen from Table 1 and the previous discussion, occupational surveys provide task data which are likely to be useful in rank-ordering tasks for

training. However, it remained to be determined how these occupational survey data might be used to prioritize tasks for entry-level training or whether additional task characteristics should be measured.

Previous research has focused on methods for using occupational survey data to make training decisions in the context of ISD. The general approach has been to have subject-matter experts in an occupation evaluate tasks for training. In one of the earliest studies in determining training priorities, members of the Personnel Specialist career ladder (732X0) judged the training emphasis needed for tasks, using a 5-point scale in which a rating of "5" indicated that the task required "considerable training emphasis" (Morsh, 1965). It appeared that, in general, tasks identified as requiring a high training emphasis varied according to the skill levels of the raters. That is, most tasks given a rating of "5" by 5-skill-level raters did not overlap with those so rated by either 7- or 9-skill-level raters. The explanation is that the more complex tasks are performed at higher skill levels due to job assignment and work experience.

In a follow-on study, Mial and Christal (1974) had instructors and supervisors rank-order 190 Medical Services Specialist (902X0) tasks in terms of their priority for resident school technical training. They encountered two difficulties in using this criterion. First, the ranking for technical training required two separate decisions. That is, judges were required to determine both how much training priority would be required and the degree to which resident school training versus on-the-job training (OJT) would be appropriate. Judges tended to agree on the relative priorities of tasks, but not as to the appropriate location for training. The second difficulty was that though there was high agreement among the raters, the ranking procedure forced equal intervals between tasks when it seemed likely that in actuality a small number of tasks would have very high training priorities and many tasks would have extremely low priorities. Rank-ordering does not allow for this expected skewed distribution.

A follow-on to the Mial and Christal study was performed by Mead (1975) for the Law Enforcement specialty (812XX), using both rankings of priority for formal training and ratings of training priority on a 7-point scale. Interrater agreement on both the ranking of the tasks (R_{kk} = .98) and the ratings of the tasks (R_{kk} = .98) was quite high for 165 tasks selected as candidates for formal resident technical training.

In sum, based on previous research, it appeared that supervisors in an occupation could agree on ratings of tasks for formal training. However, this finding was based on only subsets of tasks within a few occupations. Furthermore, the basis for these supervisors' ratings was not known. In particular, it was not clear whether these supervisory training ratings were valid measures of the task training requirement construct as used in ISD.

Specialty Training Standard (STS)

An STS provides a detailed description of the training requirements for an entire Air Force specialty (AFS). Each STS contains a comprehensive listing of tasks and knowledges which must be taught to a specified level of proficiency for a particular AFS. An STS provides information concerning the degree of training to be provided in OJT and in formal technical training courses. STSs are also used as the basis for Specialty Knowledge Tests and for career development programs. A sample STS is shown in Appendix A.

An STS is normally developed through the ISD process. Revisions are accomplished via a group meeting called a Utilization and Training Conference. In general, no simple one-to-one relationship exists between STS items and occupational survey tasks; that is, STS items are usually global in nature, encompassing a number of survey tasks. Thus, one problem in using occupational

survey data for ISD purposes concerns how to relate such data to the STSs. The main purpose of the present research was to investigate further whether supervisors' ratings of tasks can be used to establish qualitative initial skills training requirements. A secondary goal was to develop procedures for aligning occupational survey tasks with STS paragraphs such that occupational data can be used more effectively by training managers.

II. APPROACH

Two approaches were used. The first approach involved the development of rating scales and the analysis of interrater agreement on task ratings across all tasks within a diverse sample of occupations. The second approach involved construct validation of training emphasis ratings as measures of training requirements for use in ISD. This was done by showing that Recommended Training Emphasis ratings are related to other task factors that the ISD literature suggests are important for determining training requirements.

The problem of developing a rank-ordered task list for formal training is a complex one. This complexity is due in part to the complex structure of job specialties, each of which involves not only a hierarchy of skill levels but a further breakdown into job groups. Additionally, the tasks performed vary a great deal within each specialty. Certainly, it is not feasible or possible during initial skills training to teach an individual to perform every work task he or she may encounter in a specific assignment. Despite the complexity of determining job-related technical training, however, delivery of broad-based initial skills training is critical to the Air Force for job and mission success. Therefore, this research was undertaken in an attempt to derive valid, reliable, and defensible measures of training requirements for initial skills training in a specialty.

The present effort assumes that the task factors can be enumerated, that the factors can be quantified, and that a weighting scheme for optimal task ranking can be developed. The anticipated output from this research was computerized lists of tasks ordered from highest priority for formal entry-level training down to the lowest priority.

III. METHOD

In the present investigation, supervisors' ratings of Recommended Training Emphasis, along with other task data believed to be related to the determination of training requirements, were collected and analyzed for all tasks in a large sample of AFSs. A major research issue centered on whether and to what degree such ratings were construct valid.

As mentioned earlier, Table 1 presents some of the task factors that have been proposed for use in training development. Although the scope of this paper does not allow for a full discussion of each of the factors listed in the table, the specific task factors measured in the present effort are described below.

Task Factors

The following task factors were addressed in the present research:

Recommended Training Emphasis. This factor is defined as the recommended emphasis that should be given in formal training of the task for entry-level airmen, regardless of where that training takes place (i.e., resident technical training, Field Training Detachment (FTD) training, or OJT).

Probable Consequences of Inadequate Performance. This factor indicates the consequences that would likely result if the task were performed inadequately. This factor, suggested by Christal (1970), is one of two criticality factors used in the present research.

Task Delay Tolerance. The Task Delay Tolerance factor indicates the amount of time available, on the average, between the time an airman recognizes that he or she should perform a task to the time that the onset of task performance must occur if the task is to be performed successfully. This is the second of the two criticality factors used and was suggested by Carpenter (1970) and AFP 50-58 (1978).

Task Difficulty. Task Difficulty is defined as the time it would take to learn to perform a task satisfactorily relative to the time it would take to learn an average task in a given specialty. Task Difficulty has been posited as important to the training decision by AFM 50-2 (1979), AFP 50-58 (1978), and Chamberlain (1964).

Percent Members Performing. The percentage of job incumbents who actually perform a particular task has been identified by most experts as a factor for consideration in making training decisions (AFM 50-2, 1979; AFP 50-58, 1978; Ammerman, 1977; Carpenter, 1970; Chamberlain, 1964; Christal, 1970). Percent Members Performing is related to the diversity (or universality) of performance, in the sense that if a large percentage of members perform a task, this normally indicates that the task is performed in many locations throughout the Air Force. Such a task would be a likely candidate for inclusion in initial skills training. Percent Members Performing can also be used to estimate time to initial performance, by analyzing the percentages of members performing the task with different amounts of experience on the job. Time to Initial Performance is an important consideration because of the perishability of training associated with the period between training and performance. For example, if few incumbents with less than two years of job experience perform a task, then training on this task would probably not be suitable for inclusion in initial skills training. For the present effort, Percent Members Performing was defined as the percentage of first-job airmen who perform each task. "First-job airmen" was operationally defined as airmen who had served no more than 24 months in the specialty.

Percent Time Spent. The percentage of time spent on tasks by first-term (first-job) airmen is a factor considered relevant by Chamberlain (1964), Morsh (1965), and others. Relative Time Spent data for each rater can be converted to Percent Time Spent on each task by dividing the rater's Relative Time Spent rating for the task by the sum of the rater's ratings for all tasks. When the occupational survey task statements for a specialty are written at the same level of specificity, the Percent Time Spent index may be related to Frequency of Performance, a factor often discussed in the literature (AFM 50-2, 1979; Chamberlain, 1964). If the task statements are not written at the same level of specificity, however, then the Percent Time Spent index may not be simply related to frequency of performance.

Task Grade Level. The Task Grade-Level index reflects the average military grade or rank of airmen who perform a particular task. Task Grade Level was hypothesized to add information about the job that is not included in the Percent Members Performing or Percent Time Spent factors. The Task Grade-Level index can be thought of as a refinement of the Time to Initial Performance factor since grade is highly correlated with time in service.

Factor Rating Scales

The factor rating scales employed in the present effort are listed in Table 2. These 9-point scales for collecting data on the various task factors were used to compare all tasks performed within a specialty.

Table 2. Task Factor Scales

1. Recommended Training Emphasis

Rating Scale	
1	Extremely little training emphasis
2	Very little
3	Little
4	Below average
5	Average
6	Above average
7	Heavy
8	Very heavy
9	Extremely heavy training emphasis

2. Probable Consequences of Inadequate Performance

1	Minimal (inadequate performance has minimal consequences)
2	Slight
3	Not very serious
4	Fairly serious
5	Serious
6	Very serious
7	Extremely serious
8	Almost disastrous
9	Disastrous (inadequate performance has disastrous consequences)

3. Task Delay Tolerance

1	Extremely low (must do immediately)
2	Very low
3	Low
4	Below average
5	Average
6	Above average
7	High
8	Very high
9	Extremely high (can wait for a long time)

4. Task Difficulty

1	Extremely low
2	Very low
3	Low
4	Below average
5	About average
6	Above average
7	High
8	Very high
9	Extremely high

5. Relative Time Spent

1	Very small amount
2	Much below average
3	Below average
4	Slightly below average
5	About average
6	Slightly above average
7	Above average
8	Much above average
9	Very large amount

The reader will note that Table 2 lists only five scales, while eight task factors were discussed previously. Remember that incumbent raters first review the entire task list for their specialty and check those tasks which they perform in their present job. They then assign Relative Time Spent ratings to only those tasks they have checked as applicable to their present job. The checkmarks are used to compute Percent Members Performing and the Task Grade-Level index. The Relative Time Spent ratings themselves are used to compute Percent Time Spent. Thus, only five scales are necessary for collecting data on the eight task factors.

The Recommended Training Emphasis scale is in essence a 10-point scale (ranging from 1 through 9, with an implicit "0") since the absence of a rating is treated as a zero. The Recommended Training Emphasis scale differs from the Probable Consequences of Inadequate Performance, Task Difficulty, and Task Delay Tolerance scales in this respect.

The Probable Consequences of Inadequate Performance scale, the Task Delay Tolerance scale, and the Task Difficulty scale each measure the relative presence of that factor. For example, a Task Difficulty rating of "1" is used if a task's learning difficulty is extremely low compared to that of other tasks, a "5" if average, and a "9" if its learning difficulty is extremely high. The Task Delay Tolerance scale ranges from "1" ("extremely low - task must be performed immediately") to "9" ("extremely high - can do when ready"). Note that for this latter scale the least delay permissible is rated "1" and the greatest delay permissible is rated "9." That is, the most critical task is rated "1" and the least critical task is rated "9." Thus, this scale is reversed from the other scales used in this research. Therefore, results must be interpreted with this fact in mind.

The Task Grade-Level index for each task is computed using a weighted formula based on the ratio of the percent of members in each grade who perform the task to the percent of all members in each grade. In effect, this procedure gives equal weight to each grade level. Otherwise, the much larger sample sizes in the middle grades relative to those in the very high and very low grades would force the Task Grade-Level index to be a middle-grade value for almost every task.

Data Collection Procedures

The job inventories for collection of task-level data on Percent Members Performing, Percent Time Spent, and Task Difficulty were developed by the United States Air Force Occupational Measurement Center (USAFOMC) as part of their operational occupational analysis program. These inventories were composed of comprehensive task lists and associated rating scales. They were administered by consolidated base personnel offices in operational units worldwide. Airmen within 18 specialties checked and rated the tasks performed in their current jobs. Task Difficulty data were gathered by USAFOMC by having groups of supervisors in each specialty rate the tasks on this factor. A list of the 18 specialties surveyed, along with information concerning the number of tasks and the percent of airmen surveyed in each specialty, are provided in Appendix B.

For each of the 18 specialties studied, 60 to 300 supervisors in the 7- and 9-skill levels from various major commands and locations were identified by the Air Force Human Resources Laboratory (AFHRL) and sent survey booklets for rating tasks in their specialties on the following task factors: Probable Consequences of Inadequate Performance, Task Delay Tolerance, and Recommended Training Emphasis for entry-level airmen. The supervisor rating data for tasks were then merged with incumbent rating data. For each specialty, the task list was the same as that used in the USAFOMC data collection effort; however, both the scales and the raters were different. Examples of the survey booklets are provided in Appendix C.

Analyses

Intercorrelations among the task factors were examined to determine the relationship between each of the other task factors and the Recommended Training Emphasis factor. Further, the distributions of ratings on the Recommended Training Emphasis scale were examined to obtain an indication of the rating skewness.

The procedures used to analyze the data collected included: Comprehensive Occupational Data Analysis Programs (CODAP), regression analysis, and HIER-GRP, a judgment analysis hierarchical grouping technique. REXALL (Christal & Weissmuller, 1976) was used for analyzing the interrater agreement among judges on task factor ratings. Reliability of the ratings was computed using the intraclass correlation statistic (Guilford, 1954; Lindquist, 1953). The R_{11} statistic provides the estimated reliability of ratings of a single rater, and R_{kk} gives the estimated reliability for mean ratings from k raters. A separate analysis of interrater agreement was performed for each specialty and for each task factor in the inventory. Goody (1976) discussed the use of this procedure to identify and delete divergent raters, thus improving interrater agreement.

Recommended Training Emphasis Equations. In order to determine empirically whether the Recommended Training Emphasis factor captured the training-related variance contained in the dimensions specified in the ISD training requirements model, a multiple regression model was developed and tested which used the Recommended Training Emphasis factor as the criterion and the other task factors as second-degree polynomial predictors (in order to address the possibility of curvilinearity of regression).

Analyses were conducted within and among specialties. The within-specialty analyses included the development of separate regression equations to predict Recommended Training Emphasis for each specialty. That is, one unique equation was developed for each specialty.

The analyses conducted among specialties were designed to test the generalizability and utility of "averaged" regression equations in predicting Recommended Training Emphasis. This averaged equation would allow the prediction of Recommended Training Emphasis across all specialties by means of a single equation. The relationships among the 18 models derived for the individual specialties were analyzed using an adaptation of the HIER-GRP technique (Gott, 1978). The objective of HIER-GRP is to find homogeneous sets of regression equations for a common set of criterion and predictor variables. Equations are grouped in a stepwise manner so as to minimize the overall loss of predictive efficiency at each stage. The number of groups is reduced by one at each stage until only one final group remains. The formation of each group is based on an "average" equation from the original set of equations. The criterion used in the present research to halt clustering was the loss in predictive efficiency associated with combining any two groups. A decision value representing a system loss in R^2 greater than .05 was considered unacceptable for further grouping.

Recommended Training Emphasis Products. One objective of this research was to develop computer software which merged training priority with other occupational information. This approach utilized the ISD concept of analyzing system requirements and defining educational and training requirements. Tasks within each specialty were merged with STS items, with the tasks listed in descending order based on their Recommended Training Emphasis for each STS item. This procedure cross-referenced inventory tasks to each STS item--a process usually done by subject-matter specialists--and produced a printed report of the tasks rank-ordered within STS areas, together with any desired task factor data.

IV. RESULTS

Results of this research are presented in the following categories: (a) task factor intercorrelations, (b) interrater agreement, (c) Recommended Training Emphasis equations, and (d) Recommended Training Emphasis products.

Task Factor Intercorrelations

The intercorrelations of task factors for each specialty are shown in Appendix D. The correlations of Recommended Training Emphasis with the other task factors varied greatly; however, Recommended Training Emphasis consistently correlated highest with Percent Members Performing - First Job and Percent Time Spent - First Job. In addition, the correlations of Recommended Training Emphasis with both the Probable Consequences of Inadequate Performance factor and the Task Delay Tolerance factor were always in the expected direction (i.e., the most critical tasks received the highest training emphasis ratings, etc.) Also, there were many low and moderately negative correlations between Recommended Training Emphasis and Task Difficulty; however, there were positive correlations between Task Difficulty and the Task Grade-Level index, indicating that the higher-grade-level tasks take longer to learn than lower-grade tasks. Finally, the Percent Members Performing and Percent Time Spent factors were very highly correlated.

The average mean rating and standard deviation of the mean ratings for each of the task factors are shown in Table 3 for each AFSC. The average mean for each task factor is the average of all task means. The Recommended Training Emphasis distributions were usually positively skewed because most tasks had low Recommended Training Emphasis ratings, whereas a relatively small number of tasks had moderate to high Recommended Training Emphasis ratings. This skewness of the Recommended Training Emphasis ratings for each specialty can be seen in Appendix E.

Interrater Agreement

As indicated in Table 4, most of the task factors showed good interrater agreement, which reflects stable ratings within each of the specialties. The high, low, and median R_{kk} values for the task factors were as follows: (a) Recommended Training Emphasis: .98, .89, and .95; (b) Probable Consequences of Inadequate Performance: .96, .61, and .90; (c) Task Delay Tolerance: .95, .68, and .90; and (d) Task Difficulty: .96, .89, and .94.

Recommended Training Emphasis Equations

Analysis Within Specialties. Explanatory regression models were computed to test the ability of the other six task factors to account for the Recommended Training Emphasis ratings. A single equation was computed for each specialty. The equation was computed as a full 12-variable model, using all six training factors and their respective vectors of squared values as predictors. The R^2 values for these regression models indicate how well each model explains the Recommended Training Emphasis. Table 5 lists these values by AFSC; they ranged from .59 to .95, with a median of .86. The highest R^2 values were obtained for the Nondestructive Inspection, Airframe Repair, and Vehicle Maintenance specialties. Because the parsimony of the solution was not important for this application, restricted regression models were not computed (Christal, 1968).

As shown in Figure 1, the HIER-GRP analysis of the 18 specialty-specific regression models produced two acceptable specialty groupings: Policy A (13 specialties, R^2 = .72) and Policy B

Table 3. Task Factor Means and Standard Deviations

		Recommended training emphasis		Conseq of inadequate performance		Task delay tolerance		Learning difficulty		Percent performing first-job		Percent time spent first-job		Task grade-level index	
AFSC	N Tasks	Avg Mean	SD	Avg Mean	SD	Avg Mean	SD	Avg Mean	SD	Avg Mean	SD	Avg Mean	SD	Avg Mean	SD
293X3	345	2.26	1.44	4.54	.85	4.47	1.07	3.51	1.46	11.88	15.59	.29	.47	6.48	1.17
304X0	322	2.38	1.50	4.35	1.02	5.59	.90	3.99	.53	11.38	15.38	.31	.54	5.45	1.27
304X4	730	1.82	1.15	4.36	.74	5.13	.83	3.91	.62	10.10	11.74	.14	.22	4.43	1.27
328X3	808	1.02	1.25	4.78	.53	4.88	1.91	4.07	1.14	6.03	12.35	.12	.29	4.83	2.12
423X1	736	2.63	1.34	5.44	.15	5.55	.91	4.53	.79	18.11	20.66	.14	.19	4.49	1.12
423X4	575	2.89	1.55	5.33	1.10	4.90	1.06	4.75	.88	19.85	18.55	.17	.22	4.80	.94
427X5	252	3.48	2.16	4.41	1.33	5.23	1.30	5.10	1.00	28.18	27.87	.40	.52	6.46	1.13
472X2	831	2.39	2.29	5.36	.73	3.91	.66	3.92	.73	16.47	24.50	.12	.19	4.93	1.35
531X5	230	3.89	2.29	4.99	.92	5.26	.98	3.90	.58	42.75	29.16	.43	.36	4.84	.88
552X5	407	3.32	1.62	4.24	.69	4.55	.63	4.10	.69	26.34	22.27	.26	.31	5.21	1.15
631X0	374	3.22	1.92	4.93	1.29	4.25	1.13	4.34	.90	10.02	10.62	.27	.49	5.42	1.42
651X0	328	2.85	1.63	4.66	.57	4.31	.81	3.94	.69	11.67	14.00	.30	.51	6.07	1.19
672X1	1201	1.29	1.41	4.39	.37	4.52	.47	4.14	.69	2.78	7.12	.08	.25	5.66	1.71
672X2	1202	1.21	1.37	4.45	.44	4.94	.55	4.14	.69	2.98	5.75	.08	.19	4.53	2.44
902X0	505	3.44	1.71	5.12	.85	4.31	.83	3.77	.75	20.45	18.34	.20	.23	5.82	1.00
906X0	813	1.71	1.19	4.05	.55	4.55	.75	3.71	.85	4.61	6.60	.12	.23	5.59	1.49
911X0	344	2.59	2.00	5.19	.90	4.89	.99	4.25	.68	15.17	19.03	.29	.49	5.00	1.27
981X0	319	2.33	2.06	4.40	.79	4.67	1.13	3.55	.68	18.70	22.21	.31	.49	5.60	1.56

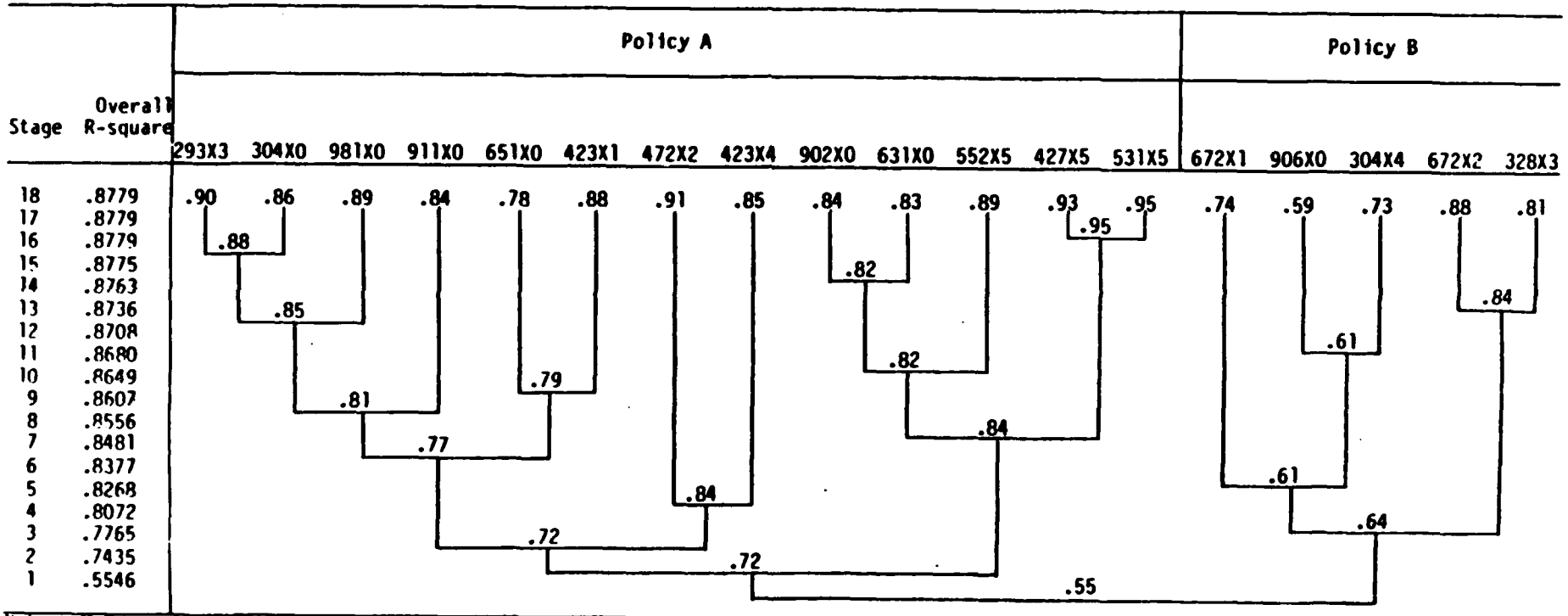
Table 4. Task Factor Reliabilities

	Recommended Training emphasis			Probable consequences of inadequate performance			Task delay tolerance			Task difficulty		
AFSC	R_{11}	R_{kk}	N Raters	R_{11}	R_{kk}	N Raters	R_{11}	R_{kk}	N Raters	R_{11}	R_{kk}	N Raters
293X3	.22	.93	205	.22	.93	36	.24	.94	38	.15	.90	59
304X0	.28	.95	199	.25	.94	37	.18	.92	39	.18	.92	79
304X4	.18	.92	315	.13	.88	63	.15	.90	49	.26	.95	108
328X3	.29	.95	248	.10	.85	45	.08	.81	43	.28	.95	39
423X1	.20	.93	137	.32	.96	38	.15	.90	41	.18	.92	44
423X4	.26	.95	282	.25	.94	51	.29	.95	54	.21	.93	57
427X5	.43	.97	267	.28	.95	52	.24	.94	55	.23	.94	66
472X2	.53	.98	25	.11	.86	28	.08	.81	24	.31	.96	84
531X5	.50	.98	178	.15	.90	57	.19	.92	50	.14	.89	46
552X5	.31	.96	125	.13	.88	77	.10	.85	45	.25	.94	76
631X0	.34	.96	277	.29	.95	53	.24	.94	56	.25	.94	66
651X0	.29	.95	295	.10	.85	58	.16	.90	51	.22	.93	79
672X1	.33	.96	73	.03	.61	52	.04	.68	48	.26	.95	75
672X2	.35	.96	131	.08	.81	59	.07	.79	54	.26	.95	75
902X0	.26	.95	302	.15	.90	93	.18	.92	95	.25	.94	58
906X0	.20	.93	270	.11	.86	100	.16	.90	95	.32	.96	73
911X0	.16	.90	68	.19	.92	30	.13	.88	24	.27	.95	71
981X0	.14	.89	89	.14	.89	63	.29	.95	44	.17	.91	36

Table 5. R-squared Values and Beta Weights for Each Specialty and for the Policy Equations for the Two-Group Stage in the Hierarchical Grouping (HIER-GRP) Solution

AFSC	R-squared	Conseq[a]	Delay[b]	Diff[c]	PMP[d]	Time[e]	Grade-Lev[f]	Conseq^2	Delay^2	Diff^2	PMP^2	Time^2	Grade-Lev^2
Policy A	.7157	.2270	-.1167	.5403	1.4989	-.2293	.8268	-.1578	- .0861	- .4768	- .8451	.1886	- .9327
293X3	.9014	-.0654	-.7807	.5630	1.0120	-.1488	.4466	.1451	.3197	- .5671	- .5490	.1076	- .5303
304X0	.8608	.0267	-.3408	.5928	.7556	-.0840	.8649	-.0984	- .0974	- .4732	- .2843	.0218	-1.1495
423X1	.8750	.4016	.6492	.7522	1.1075	-.1880	1.0104	-.1654	- .9293	- .5779	- .5510	.1780	-1.1458
423X4	.8509	.0800	1.5656	.0196	1.8679	-.5106	.1604	.1012	-1.5279	- .0149	- .0860	.2889	- .0546
427X5	.9319	-.1543	.4057	.9758	.7873	-.1966	2.2486	.1873	- .6784	- .8787	.1421	-.1032	-2.4561
472X2	.9148	.1184	-.4925	.4450	2.5118	.0161	.4496	-.1573	.4179	- .3014	-1.7202	.1411	- .4080
531X5	.9493	-.3400	.0989	.3814	2.4819	-.8089	.3017	.4828	- .1766	- .2965	-1.6026	.5666	- .5294
552X5	.8875	-.0474	.3261	1.1023	2.2075	-.8823	1.0059	.1958	- .4125	-1.0124	-1.1207	.5622	-1.1582
631X0	.8294	1.3857	-.5124	.4864	1.4556	-.2507	1.3250	-1.3366	.3035	- .4870	- .9948	.3352	-1.5078
651X0	.7753	-.3262	-.6648	.6375	.5680	-.3650	.9643	.3835	.2335	- .5978	- .3010	.3113	-1.3888
902X0	.8388	.9425	-.7985	.7635	2.0618	-.7966	.3118	-.8697	.5704	- .8145	-1.1474	.5826	- .4274
911X0	.8375	.5535	-.7094	.0494	.9269	-.1997	2.5157	-.4766	.3205	- .0042	- .2791	-.0709	-2.6515
981X0	.8883	-.0320	-.5314	.9570	.4378	.9821	.7439	.0702	.2242	- .9670	- .4790	-.4115	- .8685
Policy B	.6425	.0421	.0440	.7841	1.4583	.0129	.2371	.0510	- .1200	- .7013	-1.0284	.1958	- .2373
304X4	.7292	-.4085	.3893	1.0663	1.4492	-.2707	1.2944	.3605	- .5291	- .7827	- .6068	.1916	-1.3296
328X3	.8062	.3049	-.4130	.2643	1.4949	.1421	-.0645	-.2772	.2561	- .2493	- .9159	-.0098	.2307
672X1	.7427	.0179	.7122	.8550	1.4598	.2074	-.0068	.2490	- .6015	- .8871	-1.3492	.2719	- .0259
672X2	.8808	.1579	-.6346	.5291	1.7593	-.3568	-.0070	-.1467	.4311	- .5215	-1.0930	.4015	.0969
906X0	.5858	.0109	.2190	1.5261	1.1554	.4189	.5162	.1247	- .2766	-1.2035	-1.0138	-.0378	- .7575

[a]Probable Consequences of Inadequate Performance.
[b]Task Delay Tolerance.
[c]Task Difficulty.
[d]Percent Members Performing, - First-Job.
[e]Percent Time Spent, - First-Job.
[f]Task Grade-Level Index.



Note. Values within the hierarchical grouping structure are R-squares for each specialty or group equations.

Figure 1. Hierarchical Grouping of Recommended Training Emphasis Regression Models.

(5 specialties, R^2 = .64). When the five Policy B equations were added to those of Policy A, their overall R^2 value decreased from .64 to .55. This decrease was both statistically and practically significant ($p < .0001$), indicating that the AFSs in Policy A differ from those in Policy B as to how the task factors should be weighted and combined to estimate Recommended Training Emphasis for particular tasks.

Examination of the standardized beta weights for the Policy A and Policy B regression models, and of the zero-order task factor intercorrelations, indicates that: (a) Policy A equations placed more importance on the Task Grade-Level index than did Policy B equations, (b) Policy A equations had a much higher median R^2 value than did Policy B equations (.88 versus .74), and (c) Policy B equations were more consistent than Policy A equations in their use of the Percent Members Performing factor.

Recommended Training Emphasis Products

After tasks within each specialty were rank-ordered as to the amount of Recommended Training Emphasis, this information was then merged with other task factors or STS items and presented in a variety of computer products developed to aid trainers in applying task data.

Recommended Training Emphasis Printout. The Recommended Training Emphasis factor printout (FACPRT) lists tasks in descending order based on their Recommended Training Emphasis (Appendix F). Also shown for each task are the mean ratings for the other task factors. Task data can be arrayed to suit the trainers' needs.

OSR-STS Printout. This computer product merges Occupational Survey Report data with STS items (Appendix G). This printout lists tasks in STS paragraph sequence, identifying each according its OSR duty and its OSR task number. For each, mean task factor ratings are provided. This capability represents a breakthrough in that it allows task information to be displayed in formats familiar to trainers, a capability heretofore not available as an automated product.

Executive Summary Printout. The Executive Summary aggregates task-level data by STS item (Appendix H). The printout shows the number of tasks that apply to each STS item and the mean task factor ratings for these tasks. A variety of reporting options are possible. Any number of data columns can be displayed to suit the situation.

V. DISCUSSION

Task Factor Intercorrelations

The negative correlations between Percent Members Performing - First Job and Task Difficulty demonstrated that first-term airmen are generally not performing the more-difficult-to-learn tasks. Not surprisingly, more experienced airmen perform those tasks which require greater skill and experience. A large percentage of the first-termers, however, do perform the tasks which were highly recommended for entry-level training emphasis. The Task Difficulty ratings showed little correlation or correlated negatively with Recommended Training Emphasis. Although the negative correlations were not anticipated, the finding appears reasonable in that tasks recommended for training emphasis for first-termers should be those they will perform in their first job, not the more difficult tasks in the specialty. As expected, Recommended Training Emphasis was found to be highly correlated with the criticality of task performance, as measured by Probable Consequences of Inadequate Performance and by Task Delay Tolerance.

Interrater Agreement

Approximately two-thirds of the specialties sampled showed extremely good interrater reliabilities. The R_{kk} values for Vehicle Maintenance and Nondestructive Inspection were quite high (.98). Although the R_{11} values for Ground Radio Equipment Repair, Physiological Training, and Dental and Preventive Dentistry failed to meet acceptable standards (.20 or below) even after raters who did not appear to follow instructions were eliminated, their R_{kk} values were adequate. Overall, the reliabilities demonstrated that reasonable interrater agreement can be attained for the Recommended Training Emphasis scale.

Recommended Training Emphasis Equations

Analysis Within Specialties. Regression models were developed that used the task factors to predict/explain supervisors' Recommended Training Emphasis ratings. The adequacy of predicting Recommended Training Emphasis, viewed as the construct validation of this variable, was measured by the amount of variance the ISD task factors accounted for in each specialty's policy equation (mean R^2 = .84). All but one specialty demonstrated very high predictive/explanatory efficiency. The exception (Medical Administration, R^2 = .59) suggests that this specialty may require a different set of predictors to adequately predict Recommended Training Emphasis. Its relatively low R^2 value is both practically and statistically different from that for the other specialties studied.

Analyses Among Specialties. Eighteen regression equations using task factors as predictors were grouped using HIER-GRP. Two regression models were developed which adequately predicted Recommended Training Emphasis for all of the AFSs under investigation. One generalized policy equation evolved for a set of rather homogeneous specialties, having few different jobs. The remaining specialties were included in a group of more diverse specialties, having many different jobs.

The task factors varied widely in their ability to predict Recommended Training Emphasis. Based on their zero-order correlations with Recommended Training Emphasis, the following observations were made concerning their effects. Percent Members Performing (related to the diversity or universality of performance) was found to have strong general effects across all specialties. Percent Time Spent was moderately related to Recommended Training Emphasis. The Task Grade-Level index (a measure of the time to initial performance) showed moderate to high effects for Policy A, but extremely little effect for Policy B. One of the criticality factors, Task Delay Tolerance, also showed stronger effects for Policy A than for Policy B. Task Difficulty (a measure of the time to learn a task) showed a slight negative relationship to the criterion. The other criticality factor, Probable Consequences of Inadequate Performance, resulted in low to moderate effects across specialties. In addition, the relationships among the task factors varied considerably by specialty.

Recommended Training Emphasis Products

Matching Recommended Training Emphasis data with STS information provides a useful tool for the training developers at technical schools. Listings of tasks ordered according to their Recommended Training Emphasis show which tasks are the most important for training. Trainers can then devise their own cutoffs in identifying tasks to train for each specialty. A rule-of-thumb recommended by Vaughan (1978) is to include any task whose Recommended Training Emphasis is at least one standard deviation above the mean; exclude those at least one standard deviation below the mean; and for those tasks that are within one standard deviation of the mean, judge their relevance to training on the basis of the other task factors.

Conclusions

Recommended Training Emphasis ratings are construct valid according to the ISD model, as the ratings can be predicted using ISD task factors. Recommended Training Emphasis ratings are also reliable, since independent ratings by supervisors show high agreement. Thus, Recommended Training Emphasis ratings provide a good basis for selecting tasks for training. Equations relating task factor ratings to Recommended Training Emphasis ratings differ across specialties. Thus, there is no universal equation. It is important to note that although Recommended Training Emphasis ratings are useful for most AFSs, there are a small number of specialties for which they may not be immediately usable, due to the level of interrater agreement for these diversified specialties. Future research should address these diversified specialties which have a large number of jobs and fail to achieve acceptable reliabilities. Nonetheless, the process developed in the present effort for deriving task lists in order of priority for training is a technique which technical schools may readily adopt to improve training.

Recommendations

The routine collection of Recommended Training Emphasis ratings provided by supervisory personnel is recommended for prioritizing tasks for training entry-level airmen. In terms of cost effectiveness and data collection requirements, it is recommended that the Consequences of Inadequate Performance and Task Delay Tolerance factors be collected only for those specialties for which they are of special interest, since Recommended Training Emphasis ratings include consideration of these factors.

The computer products developed in this effort allow Recommended Training Emphasis data to be presented in modularized formats which are available to place into operation in accordance with *ATC Regulation 52-22 (1981)*. The Training Emphasis Printout, the OSR-STS Printout, and the Executive Summary Printout provide simple and reliable methods of displaying occupational survey data in a context with which training personnel are most familiar. This research recommends using Recommended Training Emphasis products in the above formats to select tasks for initial skills training.

REFERENCES

Air Force Manual 50-2. (1979, May 25). Instructional system development. Washington, DC: Department of the Air Force.

Air Force Pamphlet 50-58. (1978, July 15). Handbook for designers of instructional systems (5 vols.). Washington, DC: Department of the Air Force.

Air Training Command Regulation 52-22. (1981, October 16). Occupational analysis program. Randolph AFB, TX: Department of the Air Force.

Ammerman, H.L. (1977, March). Deriving performance requirements for training. Performance content for job training, (R&D Series No. 124). Columbus, OH: The Ohio State University, The Center for Vocational Education.

Carpenter, P. (1970, September). Maintaining efficient training programs for Air Force technical specialties (Rand Report No. R527-PR). Santa Monica, CA: Rand Corporation.

Chamberlain, P.E. (1964, April). Analyzing qualitative training requirements. Proceedings Training Requirements Analysis, Second Annual Convention of the National Society for Programmed Instruction (pp. 11-33). San Antonio, Texas.

Christal, R.E. (1968). JAN: A technique for analyzing group judgment. Journal of Experimental Education, 36, 24-27.

Christal, R.E. (1970). Implications of Air Force occupational research for curriculum design. In B. B. Smith & J. Moss, Jr. (Eds.), Report of a seminar: Process and techniques of vocational curriculum development. Minneapolis, MN: University of Minnesota.

Christal, R.E. (1974, January). The United States Air Force occupational research project (AFHRL-TR-73-75, AD-774 574). Lackland AFB, TX: Occupational Research Division, Air Force Human Resources Laboratory.

Christal, R.E., & Weissmuller, J.J. (1976, May). New CODAP programs for analyzing task factor information (AFHRL-TR-76-3, AD-A026 121). Lackland AFB, TX: Occupational and Manpower Research Division, Air Force Human Resources Laboratory.

Fruchter, B., Morin, R.E., & Archer, W.B. (1963, March). Efficiency of the open-ended inventory in eliciting task statements from job incumbents (PRL-TDR-63-8, AD-418 980). Lackland AFB, TX: Personnel Research Laboratory, Aerospace Medical Division.

Goody, K. (1976, October). Comprehensive occupational data analysis programs (CODAP): Use of REXALL to identify divergent raters (AFHRL-TR-76-82, AD-A034 327). Lackland AFB, TX: Occupation and Manpower Research Division, Air Force Human Resources Laboratory.

Gott, C.D. (1978, June). HIER-GRP: A computer program for the hierarchical grouping of regression equations (AFHRL-TR-78-14, AD-A058 415). Brooks AFB, TX: Computational Sciences Division, Air Force Human Resources Laboratory.

Guilford, J.P. (1954). Psychometic methods. New York: McGraw-Hill.

Lindquist, E. (1953). Design and analysis of experiments in psychology and education. Boston: Houghton Mifflin.

Mead, D.F. (1975, September). Determining training priorities for job tasks. Proceedings, 17th Annual Conference of the Military Testing Association, (pp. 551-558). Indianapolis, IN: U.S. Army.

Mial, R.P., & Christal, R.E. (1978, April). The determination of training priority for vocational tasks. Proceedings, Psychology in the Air Force Symposium (pp. 29-33). USAF Academy, CO.

Morsh, J.E. (1965, December). Evolution of a job inventory and tryout of task rating factors (PRL-TR-65-22, AD-629-573), Lackland AFB, TX: Personnel Research Laboratory, Aerospace Medical Division.

Morsh, J.E., & Archer, W.B. (1967, September). Procedural guide for conducting occupational surveys in the United States Air Force (PRL-TR-67-11, AD-664 036). Lackland AFB, TX: Personnel Research Laboratory, Aerospace Medical Division.

Stacy, W.J., Thompson, N.A., & Thomson, D.C. (1977, October). Occupational task factors for instructional systems development. Proceedings, 19th Annual Conference of the Military Testing Association (pp. 1409-1421). San Antonio, TX: United States Air Force.

Vaughan, D.S. (1978, 30 Oct - 3 Nov). Two applications of occupational survey data in making training decisions. Proceedings, 20th Annual Conference of the Military Testing Association (pp. 213-227). Oklahoma City, OK: U.S. Coast Guard.

APPENDIX A: SAMPLE SPECIALTY TRAINING STANDARD (STS)

DEPARTMENT OF THE AIR FORCE
Headquarters, US Air Force
Washington DC 20330

STS 328X3
(For AFSCs 32833/53/73)
2 July 1975

ELECTRONIC WARFARE SYSTEMS SPECIALIST AND ELECTRONIC WARFARE SYSTEMS TECHNICIAN

1. Purpose of this Specialty Training Standard (STS). As prescribed in AFR 8-13, this STS:

a. States in column 1 of attachment 1 the tasks, knowledges, and study references (SR) necessary for airmen to perform duties in the Avionic Electronic Warfare ladder of the Airman Avionics Systems Career Field. These are based on the Specialty Descriptions effective 1 April 1973 in Change 13, AFM 39-1.

b. Indicates in columns 2A, 3A, and 4A of attachment 1 the minimum proficiency recommended for each task or knowledge for qualification at the 3, 5, and 7 skill level AFSCs. AFM 50-23 is the authority to change the proficiency level during JPG development when the local requirement is different from the level shown in this STS.

c. Shows in column 2A of attachment 1 the proficiency attained in Course 3ABR32833 (PDS Code AJ2) described in AFM 50-5. Proficiency code for the minimum proficiency recommended for the 3 skill level AFSC and the proficiency attained in the course are the same except when dual codes are entered. When dual codes are entered, the second code shows the proficiency attained in the course.

d. Provides basis for supervisors to plan and conduct individual OJT programs.

e. Provides a convenient record of on-the-job training completed when inserted in AF Form 623, "On-the-Job Training Record," and maintained in accordance with AFM 50-23.

f. Defines the knowledge requirements covered by Specialty Knowledge Tests in the Weighted Airman Promotion System.

2. Proficiency Code Key. Attachment 1 contains the Proficiency Code Key used to show proficiency level.

3. Career Development Channel of OJT. Satisfactory completion of CDC 30153 is mandatory for personnel training to AFSC 32853. Satisfactory completion of CDC 30173 and fulfillment of management training requirements specified in AFM 50-23 are mandatory for personnel training to AFSC 32873. (See ECI Catalog and Guide, Chapter 3, paragraph 3-5, for current CDC identification number for ordering purposes.)

4. Study Guidance for Weighted Airman Promotion System (WAPS). Specialty Knowledge Tests (SKTs) for promotion to E-5 are based on 5 skill level knowledge requirements. SKTs for promotion to E-6 and E-7 are based on 7 skill level knowledge requirements. SKT questions are based primarily on Career Development Courses (CDCs). However, some questions may be drawn from other references listed in this Specialty Training Standard. The CDCs listed in the index of ECI study reference material for the applicable WAPS testing cycle provide primary study reference material for the WAPS test, and no attachment 2 is required for this STS. The CDCs for SKT study are maintained in the WAPS Study Reference Library. Individual responsibilities are outlined in AFM 35-8, Chapter 19, paragraph 19-3g.

5. Recommendations. Report to ATC/TT unsatisfactory performance of individual graduates or inadequacies of this STS. Refer to specific paragraphs of this STS. See AFR 50-38.

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

DAVID C. JONES, General, USAF
Chief of Staff

JAMES J. SHEPARD, Colonel, USAF
Director of Administration

1 Attachment
Qualitative Requirements

Supersedes STS 328X3, 14 June 1973.

STS-32891

THIS BLOCK IS FOR IDENTIFICATION PURPOSES ONLY		
TRAINEE		
NAME	INITIALS (In Normal)	GRADE
ORGANIZATION		
IMMEDIATE SUPERVISOR'S NAME AND INITIALS (In Normal)		
N I	N I	
N I	N I	

QUALITATIVE REQUIREMENTS

PROFICIENCY CODE KEY		
	SCALE VALUE	DEFINITION: The Individual
TASK PERFORMANCE LEVELS	1	Can do simple parts of the task. Needs to be told or shown how to do most of the task. (EXTREMELY LIMITED)
	2	Can do most parts of the task. Needs help only on hardest parts. May not meet local demands for speed or accuracy. (PARTIALLY PROFICIENT)
	3	Can do all parts of the task. Needs only a spot check of completed work. Meets minimum local demands for speed and accuracy. (COMPETENT)
	4	Can do the complete task quickly and accurately. Can tell or show others how to do the task. (HIGHLY PROFICIENT)
* TASK KNOWLEDGE LEVELS	a	Can name parts, tools, and simple facts about the task. (NOMENCLATURE)
	b	Can determine step by step procedures for doing the task. (PROCEDURES)
	c	Can explain why and when the task must be done and why each step is needed. (OPERATING PRINCIPLES)
	d	Can predict, identify, and resolve problems about the task. (COMPLETE THEORY)
** SUBJECT KNOWLEDGE LEVELS	A	Can identify basic facts and terms about the subject. (FACTS)
	B	Can explain relationship of basic facts and state general principles about the subject. (PRINCIPLES)
	C	Can analyze facts and principles and draw conclusions about the subject. (ANALYSIS)
	D	Can evaluate conditions and make proper decisions about the subject. (EVALUATION)

- EXPLANATIONS -

* A task knowledge scale value may be used alone or with a task performance scale value to define a level of knowledge for a specific task. (Examples: b and 1b)

** A subject knowledge scale value is used alone to define a level of knowledge for a subject not directly related to any specific task, or for a subject common to several tasks.

– This mark is used alone instead of a scale value to show that no proficiency training is provided in the course, or that no proficiency is required at this skill level.

X This mark is used alone in course columns to show that training is not given due to limitations in resources

1. TASKS, KNOWLEDGES AND STUDY REFERENCES	PROFICIENCY LEVEL, PROGRESS RECORD AND CERTIFICATION								
	3. 3 Skill Level			5 Skill Level			7 Skill Level		
	A AFSC/Crs	B Date OJT Started	C Date Completed & Trainee's Supervisor's Initials	A AFSC	B Date OJT Started	C Date Completed & Trainee's Supervisor's Initials	A AFSC/Crs	B Date OJT Started	C Date Completed & Trainee's Supervisor's Initials
NOTE: Users may annotate lists of SRs to identify current references pending STS revision.									
1. CAREER LADDER PROGRESSION									
SR: AFM 39-1 (vol I)									
a. Progression in career ladder 328X3	A			B			B		
SR: AFP 39-7									
b. Duties of AFSs 32833/53/73	B			C			C		
2. COMMUNICATIONS SECURITY (TRANSMISSION SECURITY)									
SR: AFRs 205-1, 205-7									
a. Identify information as classified, unclasified, or of possible intelligence value	1b/b			2b			3c		
b. Identify official information as Top Secret, Secret, Confidential, or For Official Use Only	1b/b			2b			3c		
c. Select and recommend mode of transmission dictated by security and expediency required	1b/b			2b			3c		
d. Observe security precautions involved in communications	3b/b			3b			4c		
e. Safeguard classified/sensitive information and equipment	3b/b			3c			4c		
3. SUPERVISION AND TRAINING									
Supervision									
SR: AFRs 30-1, 30-2, 39-6									
(1) Counsel subordinates, evaluate performance of personnel, and write performance reports	-			2b			4c		
SR: AFM 39-62; AFRs 35-32, 39-30									
(2) Orient newly assigned personnel and make work assignments	-			1a			4c		
SR: AFMs 25-1 (chap 4), 50-20 (part 3), 66-1 (chap 1, vol II)									
(3) Establish and evaluate compliance with work methods and schedules, controls, performance standards, and leave schedules	-			b			3c		
SR: AFMs 25-1 (chap 5), 50-20 (part 2)									

1. TASKS, KNOWLEDGES AND STUDY REFERENCES	PROFICIENCY LEVEL, PROGRESS RECORD AND CERTIFICATION								
	2 3 Skill Level			3 5 Skill Level			4 7 Skill Level		
	A AFSC/Gs	B Date OJT Started	C Date Completed & Trainee's Supervisor's Initials	A AFSC	B Date OJT Started	C Date Completed & Trainee's Supervisor's Initials	A AFSC/Gs	B Date OJT Started	C Date Completed & Trainee's Supervisor's Initials
3a(4) Interpret directives, policies, procedures, technical orders, and schematic diagrams, and resolve difficult technical problems for subordinates	-			2b			4c		
SR: AFM 50-20 (part 5); Applicable Technical Orders									
(5) Draft or edit correspondence	-			-			3c		
SR: AFMs 10-1, 66-1 (chap [illegible], vol V)									
(6) Supervise flight line and shop maintenance and inspections	-			2b			4c		
SR: AFMs 25-1 (chap 4), 50-20 (part 3), 66-1 (chap [illegible], vol V); TO 00-20-1 (sec III and IV)									
(7) Establish requirements and maintain records for procurement of maintenance equipment, tools, technical data, and spare parts	-			2b			3c		
SR: AFMs 66-1 (chap 3, vol V), 67-1 (chap 5 and 7, part 1, vol II); TO 00-20-3 (sec II)									
(8) Review unsatisfactory equipment performance reports	-			3c			4c		
SR: 00-35D-54									
(9) Plan and maintain maintenance status boards, charts, specialist dispatch boards, and dispatch forms	-			2b			4c		
SR: AFM 66-1 (chap 2, vol II; chap 3, vol V)									
(10) Review completed maintenance and inspection forms for accuracy	-			3b			4c		
SR: AFM 66-1 (chap 3 and 4, vol II)									
(11) Supervise quality control programs and recommend methods to improve equipment performance and maintenance procedures	-			2c			3c		
SR: AFM 66-1 (chap 3, vol II); AFR 66-44									

APPENDIX B: REFERENCED OCCUPATIONAL SURVEY REPORTS (OSR)

Career Ladder	AFSC	N Tasks	Percent In Field Surveyed	Air Force Personnel Test (AFPT)	Date	Authors
Radio Operator	293X3	345	78	90-293-123	25 Jul 75	Kopala, P.S., & Eustis, J.N.
Radio Relay Equip Repair	304X0	322	61	90-304-176	15 Dec 75	Keeth, J.B., DiTullio, P.N., & Clow, G.R.
Ground Radio Equip Repair	304X4	730	35	90-304-177	1 Jul 76	Jones, T.P., DiTullio, P.N., & Eustis, J.N.
Electronic Warfare Systems Repair	328X3	808	47	90-328-219	1 Sep 74	Kopala, P.S., & Cole, G.B.
Aircraft Environment Systems Repair	423X1	736	69	90-422-180	3 Oct 76	Eustis, J.N., & Bressler, P.C.
Aircraft Pneudraulic Repair	423X4	575	59	90-421-207	30 Sep 76	Keeth, J.B., Ruck, H.W.
Airframe Repair	427X5	252	74	90-534-148	27 Feb 76	Eustis, J.N., & Bressler, P.C.
Vehicle Maintenance	472X2	831	45	90-47X-067	1 Apr 72	Jones, M.H., & Miol, R.P.
Nondestructive Inspection	531X5	230	63	90-536-150	30 May 75	Clow, G.R., & Kopala, P.S.
Plumbing	552X5	407	66	90-552-184	15 Dec 75	Cole, G.B., DiTullio, P.N., & Nolte, R.G.
Fuels Specialist	631X0	374	32	90-631-156	1 Aug 76	Eustis, J.N., DiTullio, P.N., Nolte, R.G., & Ruck, H.W.
Procurement	651X0	328	80	90-651-188	15 Mar 76	Bressler, P.C., & DiTullio, P.N.
Accounting and Finance	672X1/2	1202	57	90-671-185/186/187	31 Dec 75	Lawrence, H.G., Keeth, J.B., & Kopala, P.S.
Medical Service Specialist	902X0	505	67	90-902-191	31 Dec 75	Ballentine, R.D., Cole, G.B., Keeth, J.B., & Eustis, J.N.
Medical Administration	906X0	813	70	90-906-192	15 Dec 75	Jones, T.P., DiTullio, P.N., & Bressler, P.C.
Physiological Training	911X0	344	95	90-911-070	15 May 74	Hickerson, K.A., & Clow, G.R.
Dental & Preventive Dentistry	981X0	319	69	90-981-139/140	28 May 76	Cole, G.B., Keeth, J.B., & Eustis, J.N.

APPENDIX C: SAMPLE SURVEY BOOKLETS

READ THIS PAGE BEFORE GOING FURTHER

Have you completed the Background Information Section? Make sure, before you continue with this procedure.

PROCEDURE A. CHECKING TASKS OF PRESENT JOB

1. As you read each task in the Duty-Task section, pages 1 through 13, place a check beside each task that you perform in your present job. Put your check mark in the column headed "Check-If Done Now." When you have reached page 13, follow the arrow for your next instructions.

2. DO NOT COMPLETE THE RIGHT-HAND COLUMN AT THIS TIME.

3. If a task that you perform is not listed anywhere in the entire list, write it on page 15 or 16, but do not add tasks that are classified.

4. Do not confuse work you do yourself with work you supervise.

5. Remember, at this time you are to complete only the column headed "Check-If Done Now" for pages 1 through 13. Now, turn to page 1 and BEGIN.

PROCEDURE B. RATING TIME SPENT ON TASKS IN PRESENT JOB

1. Have you checked each task that you perform in your present job? Make sure, before you continue with this procedure.

2. Now you are to rate the relative amount of time you spend performing each task in your present job. Relative time spent means the total time you spend doing the task compared with the time you spend on each of the other tasks of your present job.

3. Use a rating of "1" if you spend a "very small amount" of time on a task. Use a rating of "2" for "much below average" time, and so on, up to a rating of "9" if you spend a "very large amount" of time on the task.

4. Remember, you are to rate only tasks that you have already checked in the first column of pages 1 through 13.

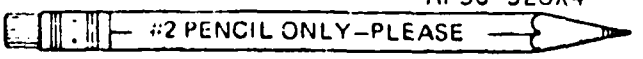
5. Place your rating, according to the 9-point scale, in the right-hand column headed "Time Spent Present Job" by blackening the appropriate circle. Caution: COMPLETELY fill in the circle you have chosen, but do NOT overlap into other circles on the same line.

6. When you have completed all your ratings in the right-hand column of pages 1 through 13, you will have completed this USAF Job Inventory and you may turn it in to your Occupational Survey Control Officer.

7. Now, turn to page 1 and BEGIN your ratings for the right-hand column.

1. Check tasks you perform now (√).
2. On the back of the book, write in any unlisted tasks which you do now.
3. In the "Time Spent" column, rate all checked (√) tasks on time spent in present job.

AFSC 328X4



G. PERFORMING OFF-EQUIPMENT MAINTENANCE

	Check	TIME SPENT Present Job
	√ IF DONE NOW	1. Very small amount. 2. Much below average. 3. Below average. 4. Slightly below average. 5. About average. 6. Slightly above average. 7. Above average. 8. Much above average. 9. Very large amount.
1. Align, or adjust AIDS/MADAR units		
2. Align, or adjust A-INS units		
3. Align, or adjust AWADS units		
4. Align, or adjust DNS units		
5. Align, or adjust FL/TFRS units		
6. Align, or adjust GPDCS units		
7. Align, or adjust INS units		
8. Align, or adjust IRS units		
9. Align, or adjust M-MRS units		
10. Align, or adjust NCS units		
11. Align, or adjust V/HCS units		
12. Align, or adjust WRCS units		
13. Examine or analyze wave shapes		
14. Fabricate or service test bench mock-ups		
15. Install dust covers		
16. Install solderless connections		
17. Isolate malfunctions to AIDS/MADAR unit subassemblies or components		
18. Isolate malfunctions to A-INS unit subassemblies or components		
19. Isolate malfunctions to AWADS unit subassemblies or components		
20. Isolate malfunctions to DNS unit subassemblies or components		
21. Isolate malfunctions to FL/TFRS unit subassemblies or components		
22. Isolate malfunctions to GPDCS unit subassemblies or components		
23. Isolate malfunctions to INS unit subassemblies or components		
24. Isolate malfunctions to IRS unit subassemblies or components		

INSTRUCTIONS

You have been selected from the respondents to the recent survey of your career ladder to provide additional information pertaining to the difficulty of tasks performed. This information will be of value in the improvement of training and testing programs. In order to accomplish this rating, follow the procedure listed below.

NOTE: In order to obtain the maximum response possible, it is requested that you rate each task of which you have any knowledge. Rate those tasks you presently perform or supervise, those tasks which you have performed at a prior time in your career, and those tasks which you have observed or supervised while being performed by others. Most personnel with your experience and background will be able to rate the majority of the tasks listed and in many cases to rate all of them.

STEP 1. Develop a frame of reference for rating task difficulty. Do this by scanning the entire listing of tasks. Pick out some easy tasks which fall between these two extremes. The tasks which fall at or near the middle of the range should then be used as reference point for judging the difficulty of all tasks in the inventory. Apply this reference point in completing STEP 2.

STEP 2. Estimate the time needed to learn to do each task satisfactorily compared with other tasks in the career ladder. Use the scale shown here and at the top of each page to rate each task.

1. Extremely Low
2. Very Low
3. Low
4. Below Average
5. Average
6. Above Average
7. High
8. Very High
9. Extremely High

Begin with the first task in the booklet and give each task of which you have knowledge, a difficulty rating from 1 to 9; record the value opposite the task statement in the column titled "TASK DIFFICULTY." Try to rate every task on each page. Remember (from STEP 1) that you are comparing each task with the other tasks in the career field.

STEP 3. The last page of the booklet is available to add any tasks you do now which are not listed. Your constructive suggestions in improving the evaluation of job tasks will be useful.

STEP 4. Review the booklet to see that you have rated the DIFFICULTY of all tasks possible. Each task can be given only one rating.

When you have finished return it to the Occupational Survey Monitor at your CBPO.

JOB INVENTORY (DUTY – TASK LIST)	AFSC 328X4	PAGE 7 OF 16 PAGES	
LISTED BELOW ARE A DUTY AND THE TASKS WHICH IT INCLUDES. RATE EACH TASK FOR DIFFICULTY BASED ON TIME NEEDED TO LEARN TO DO THE TASK. F. MAINTAINING ON-EQUIPMENT ELECTRONIC NAVIGATION SYSTEMS		TASK DIFFICULTY 1. Extremely Low 2. Very Low 3. Low 4. Below Average 5. Average 6. Above Average 7. High 8. Very High 9. Extremely High	
1. Erect or position flight line maintenance stands			39
2. Inspect egress system safety pin installations			40
3. Isolate malfunctions on adverse weather aerial delivery system (AWADS) units			41
4. Isolate malfunctions on airborne integrated data system (AIDS) units			42
5. Isolate malfunctions on astro-inertial navigation system (A-INS) units			43
6. Isolate malfunctions on doppler navigation system (DNS) units			44
7. Isolate malfunctions on forward-looking/terrain following radar system (FL/TFRS) units			45
8. Isolate malfunctions on general purpose digital computer system (GPDCS) units			46
9. Isolate malfunctions on inertial navigation system (INS) units			47
10. Isolate malfunctions on inertial reference system (IRS) units			48
* * * * * * * * * *			
11. Isolate malfunctions on maintenance analysis detection and recording systems (MADARS)			49
12. Isolate malfunctions on multi-mode radar system (M-MRS) units			50
13. Isolate malfunctions on navigation computer system (NCS) units			51
14. Isolate malfunctions on velocity/heading computer system (V/HCS) units			52
15. Isolate malfunctions on weapons release computer systems (WRCS)			53
16. Make adjustments on installed equipment			54
17. Operate flight line generator equipment			55
18. Operate flight line light carts			56
19. Operate or service maintenance dispatch vehicles			57
20. Perform operational tests on inertial or radar navigation systems			58
* * * * * * * * * *			

INSTRUCTIONS

1. In the Air Force, the consequences of inadequate performance of some tasks are far more serious than for other tasks. For example, if inadequate performance of a task will almost certainly cause an aircraft to crash, the consequences would be far more serious than inadequate task performance which merely causes inconvenience or irritation. As another example, the probable consequences of inadequate performance in responding to a fire alarm would be far more serious than the probable consequences of inadequate performance in folding hospital linen.

2. This booklet contains a listing of tasks performed in your career field. Rate each task to indicate the Probable Consequences of Inadequate Performance of the task, using the following rating scale. It is recognized that the actual consequences of inadequate performance of many tasks can vary, depending on circumstances. In making your ratings, please try to indicate "probable consequences" in the most common, typical circumstances in your career field.

3. Using the rating scale below, assign a numerical rating to each task in this booklet which you feel describes the Probable Consequences of Inadequate Performance of the task. Make your ratings by simply writing a number 1 through 9 in the column to the right of each task. Be sure to rate <u>all</u> tasks.

Rating Scale

If the task is <u>not</u> done correctly, the <u>probable</u> consequences of inadequate performance would be:

1. Minimal (inadequate performance has minimal consequences)
2. Slight
3. Not very serious
4. Fairly serious
5. Serious
6. Very serious
7. Extremely serious
8. Almost disastrous
9. Disastrous (inadequate performance has disastrous consequences)

4. Your efforts in completing this booklet will be sincerely appreciated. When you have finished your ratings, please return this booklet to your CBPO/DPMCC.

JOB INVENTORY (DUTY - TASK LIST)	PAGE 48 OF 54 PAGES	
If the task is Not done correctly, the Probable Consequences of Inadequate Performance would be:	PERSONNEL CONSEQUENCES OF INADEQUATE PERFORMANCE 1. Minimal 2. Slight 3. Not Very Serious 4. Fairly Serious 5. Serious 6. Very Serious 7. Extremely Serious 8. Almost Disastrous 9. Disastrous	
1. Troubleshoot, adjust or remove or replace parts of ALFRED-9500		45
2. Troubleshoot, adjust or remove or replace parts of AN/ALA-27		46
3. Troubleshoot, adjust or remove or replace parts of AN/ALA-28		47
4. Troubleshoot, adjust or remove or replace parts of AN/ALM-11		48
5. Troubleshoot, adjust or remove or replace parts of AN/ALM-14		49
6. Troubleshoot, adjust or remove or replace parts of AN/ALM-15A		50
7. Troubleshoot, adjust or remove or replace parts of AN/ALM-16		51
8. Troubleshoot, adjust or remove or replace parts of AN/ALM-17A		52
9. Troubleshoot, adjust or remove or replace parts of AN/ALM-18		53
10. Troubleshoot, adjust or remove or replace parts of AN/ALM-20A		54
* * * * * * * * * *		
11. Troubleshoot, adjust or remove or replace parts of AN/ALM-22		55
12. Troubleshoot, adjust or remove or replace parts of AN/ALM-23		56
13. Troubleshoot, adjust or remove or replace parts of AN/ALM-25		57
14. Troubleshoot, adjust or remove or replace parts of AN/ALM-26A		58
15. Troubleshoot, adjust or remove or replace parts of AN/ALM-27A		59
16. Troubleshoot, adjust or remove or replace parts of AN/ALM-28		60
17. Troubleshoot, adjust or remove or replace parts of AN/ALM-33		61
18. Troubleshoot, adjust or remove or replace parts of AN/ALM-47		62
19. Troubleshoot, adjust or remove or replace parts of AN/ALM-48		63
20. Troubleshoot, adjust or remove or replace parts of AN/ALM-58		64
* * * * * * * * * *		

INSTRUCTIONS

1. This booklet contains a listing of tasks performed in your career field. You are asked to rate each task to indicate Task Delay Tolerance. Task Delay Tolerance means the amount of time a person can delay before starting to perform the task.

a. Extremely low delay tolerance means the task must be done immediately, without delay. For example, "responding to a fire alarm" is a task which must be done without delay.

b. Extremely high delay tolerance means there is no hurry and a person usually has time to ask someone else how to do it, look it up in a manual or tech order, or postpone the task until later. For example, "cleaning out record files" could be delayed for a long time.

2. Rate each task on Task Delay Tolerance, using the following rating scale. It is recognized that task delay tolerance can vary depending on circumstances. In making your ratings, please try to indicate task delay tolerance in the most common, typical circumstances in your career field.

3. Using the rating scale below, assign a numerical rating to each task in this booklet which you feel describes the appropriate task delay tolerance. Make your ratings by simply writing a number 1 through 9 in the column to the right of each task. Be sure to rate all tasks.

Rating Scale	Task Delay Tolerance
1	Extremely low delay (must do immediately)
2	Very low
3	Low
4	Below average
5	Average
6	Above average
7	High
8	Very high
9	Extremely high delay (can wait for a long time)

4. Your efforts in completing this booklet will be sincerely appreciated. When you have finished your ratings, please return this booklet to your CBPO/DPMCC.

JOB INVENTORY (DUTY - TASK LIST)	PAGE 46 OF 54 PAGES	
Rate each task to indicate the amount of time a person can delay before starting to perform the task.	TASK DELAY TOLERANCE 1. [illegible] 2. Very Low 3. Low 4. Below Average 5. Average 6. Above Average 7. High 8. Very High 9. Extremely High Delay	
1. Operate AG-445 recorder reproducers		15
2. Operate AN/GLH-9 recorder reproducers		16
3. Operate AN/GLH-10 recorder reproducers		17
4. Operate AN/GYH-4 recorder reproducer		18
5. Operate D-600 recorder reproducers		19
6. Operate FL-300S recorder reproducers		20
7. Operate GYQ-6 recorder reproducers		21
8. Operate LDR-200 recorder reproducers		22
9. Operate K-80 tape degausers		23
10. Operate QRC-159A(T) recorder reproducers		24
* * * * * * * * * * *		
11. Operate Ticor-II recorder reproducers		25
12. Operate Tidax recorder reproducers		26
13. Operate VR-2600S recorder reproducers		27
14. Operate VR-3600 recorder reproducers		28
15. Operate 1508 visicorder analyzers		29
16. Troubleshoot, adjust, or remove or replace parts of AG-445 recorder reproducers		30
17. Troubleshoot, adjust, or remove or replace parts of AN/GLH-9 recorder reproducers		31
18. Troubleshoot, adjust, or remove or replace parts of AN/GLH-10 recorder reproducers		32
19. Troubleshoot, adjust, or remove or replace parts of AN/GYH-4 recorder reproducers		33
20. Troubleshoot, adjust, or remove or replace parts of D-600 recorder reproducers		34
* * * * * * * * * * *		

INSTRUCTIONS

1. This booklet contains a listing of tasks performed in your career ladder. You are asked to check and rate tasks for which you recommend formal training for first-term airmen in your career ladder.

2. Please complete this booklet in two steps:

   Step 1. Read through the list of task statements. As you read, check (✓) each task for which you recommend formal training for first-term airmen in your career ladder. Make your checks in the CHECK (✓) column, to the right of the listed task statements.

   Step 2. Rate only the tasks you checked, to indicate how much formal training emphasis you recommend for first-term airmen in your career ladder. Using the following 9-point rating scale, make your ratings by writing the numbers 1 through 9 in the TRAINING EMPHASIS column.

Rating Scale	Formal Training Emphasis Recommended for First-Termers
1	Extremely little training emphasis
2	Very little
3	Little
4	Below average
5	Average
6	Above average
7	Heavy
8	Very heavy
9	Extremely heavy training emphasis

3. Your efforts in completing this booklet will be sincerely appreciated. When you have finished your ratings, please return this booklet to your CBPO/DPMCC.

1. Check (/) each task for which you recommend formal training for first-term airmen.

2. In the Training Emphasis column, rate only the tasks you checked, to indicate how much formal training emphasis you recommend for first-term airmen.

	CHECK	TRAINING EMPHASIS	
	√ Recommend Formal Training	1. Extremely Little 2. Very Little 3. Little 4. Below Average 5. Average 6. Above Average 7. Heavy 8. Very Heavy 9. Extremely Heavy	
1. Adjust tape recorder brakes			48
2. Change fuses on equipment			49
3. Clean, degrease, or align tape heads			50
4. Lubricate equipment components			51
5. Paint radomes			52
6. Put jumper wires onto printed circuit boards			53
7. Remove or replace cables or connectors			54
8. Remove or replace coaxial cables			55
9. Remove or replace coils or transformers			56
10. Remove or replace crystals			57
* * * * * * * * * * *			
11. Remove or replace diodes			58
12. Remove or replace gaskets, seals, or bearings			59
13. Remove or replace heat splices			60
14. Remove or replace integrated circuits			61
15. Remove or replace knobs or controls			62
16. Remove or replace light sensors			63
17. Remove or replace minor hardware such as latches, screws, or hinges			64
18. Remove or replace nixie or digital readout tubes			65
19. Remove or replace nosecones or tailcones on chaff dispensers			66
20. Remove or replace potting compounds			67
* * * * * * * * * * *			

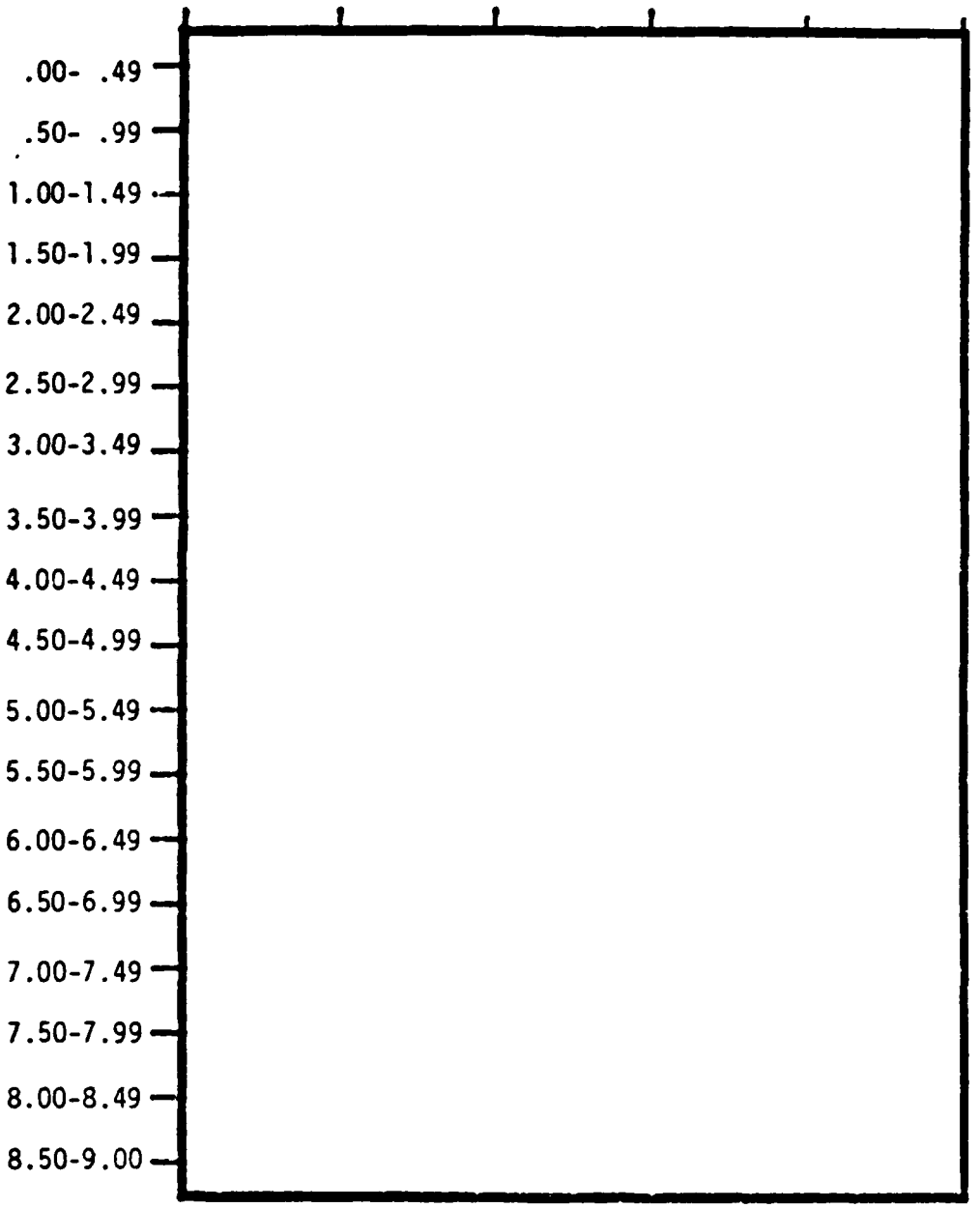
APPENDIX D: INTERCORRELATIONS OF TRAINING FACTORS FOR EACH SPECIALTY

AFSC	1						2					3				4			5		6
	2	3	4	5	6	7	3	4	5	6	7	4	5	6	7	5	6	7	6	7	7
293X3	38	-82		82	75	-66	-63					23	-58	-55	44				96	-70	-67
304X0	44	-80		73	54	-71	-51	31	21		-45		-51	-33	-51	-22	-26	29	92	-52	-37
304X4	20	-35		77	71	-21	-70	53			-50	-16	-22	-21	44	-22	-20	-12	97	-15	-15
328X3	39	-52	-49	77	71	14	-54		27	21		38	-37	-34		-54	-52	-16	96		
423X1	63	-79	-11	78	70	-47	-61		31	24	-57		-59	-53	33	-32	-31	31	98	-42	-36
423X4	43	-27	-20	88	80	-25	-84	31	38	31	-54	-28	-25	-20	58	-20	-24		96	-29	-26
427X5	89	-95	-49	88	77	-84	-83	-16	71	60	-80	53	-87	-79	79	-58	-52	50	95	-84	-72
472X2	15	-12	-30	87	78	-43	-36	11	10	03	-27	38	-18	-24	-09	-50	-55	29	94	-47	-37
531X5	72	-80		88	82	-78	-81	41	57	54	-46		-74	-72	58	-16	-20		98	-66	-61
552X5	31	-32	-35	79	65	-73	-52	44					-21	-22		-61	-59	39	95	-68	-56
631X0	36	-75	-64	74	63	-61	-70		15	16	-63	56	-56	-48	75	-61	-48	55	94	-49	-44
651X0	41	-72		60	54	-65	-66	60	15			-13	-37	-31	31		-13	30	94	-61	-59
672X1	43	-24	-17	70	63	-36	-57	09	28	26	-26	29	-21	-19	32	-24	-21	39	95	-35	
672X2		-71	-43	85	75	21	-24	34			-17	58	-62	-57	-11	-36	-34	-11	95	12	10
902X0	33	-59	-40	75	61	-67	-71	36			-16		-26	-17	33	-54	-49	46	93	-62	-52
906X0	28	-39		48	43	-43	-63	39	-13	-14		18	-18	-13	37	-45	-40	35	96	-37	-36
911X0	12	-76	-29	74	65			36	-16	-18	-14	31	-65	-57	-14	-43	-41	72	97		
981X0	28	-79	-61	85	79	-77	-47	23	14	14		46	-70	-64	59	-64	-62	63	97	-77	-67

Note. 1 = Training Emphasis.
2 = Probable Consequences of Inadequate Performance.
3 = Task Delay Tolerance.
4 = Learning Difficulty.
5 = Percent Members Performing-First Job.
6 = Percent Time Spent-First Job.
7 = Task Grade-Level Index.

Note 2. Correlations not significantly different from zero at the .05 level are omitted.

APPENDIX E: DISTRIBUTIONS OF RECOMMENDED TRAINING EMPHASIS MEANS FOR EACH SPECIALITY


.00- .49
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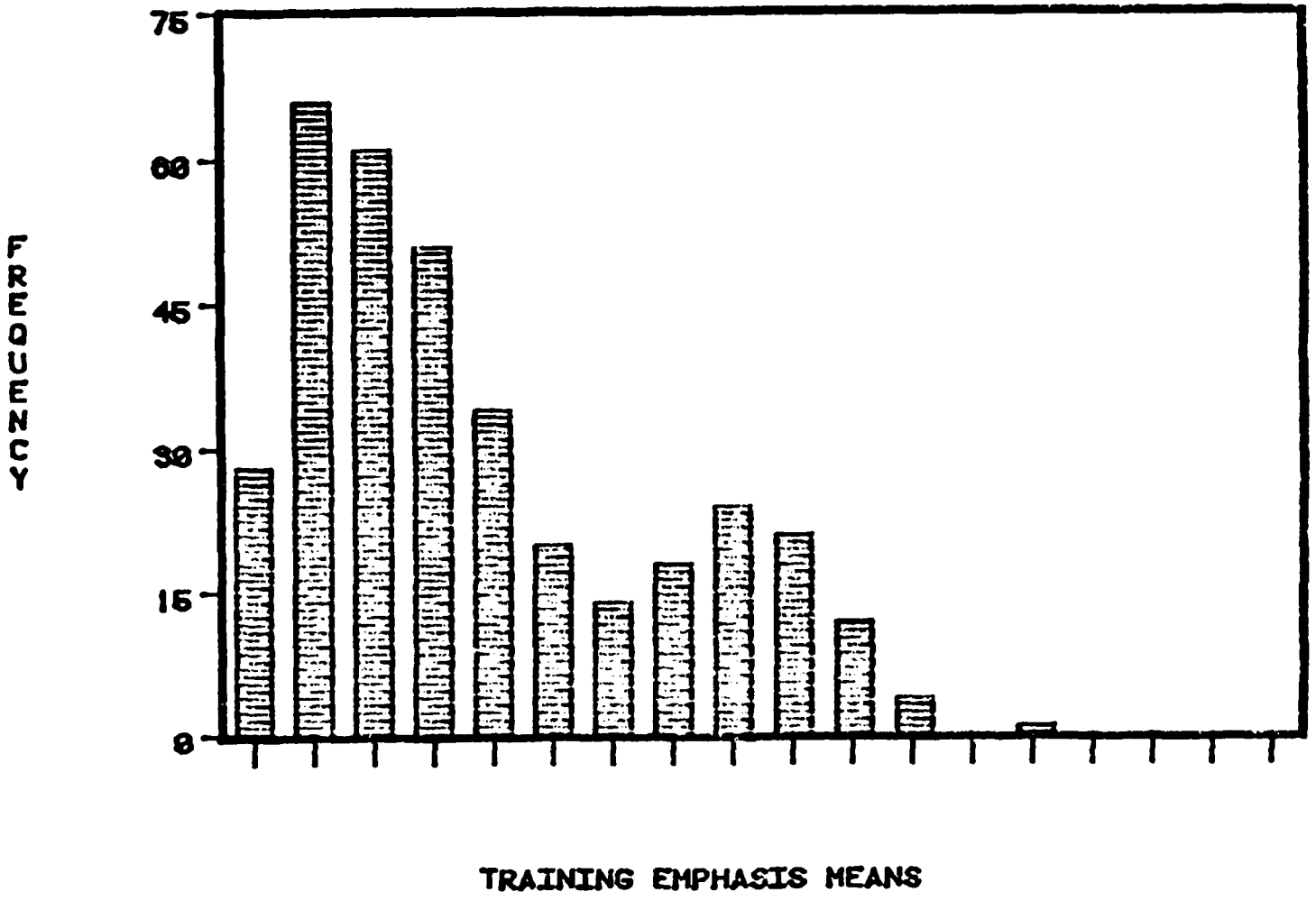
8.00-8.49
8.50-9.00

AFSC 293X3



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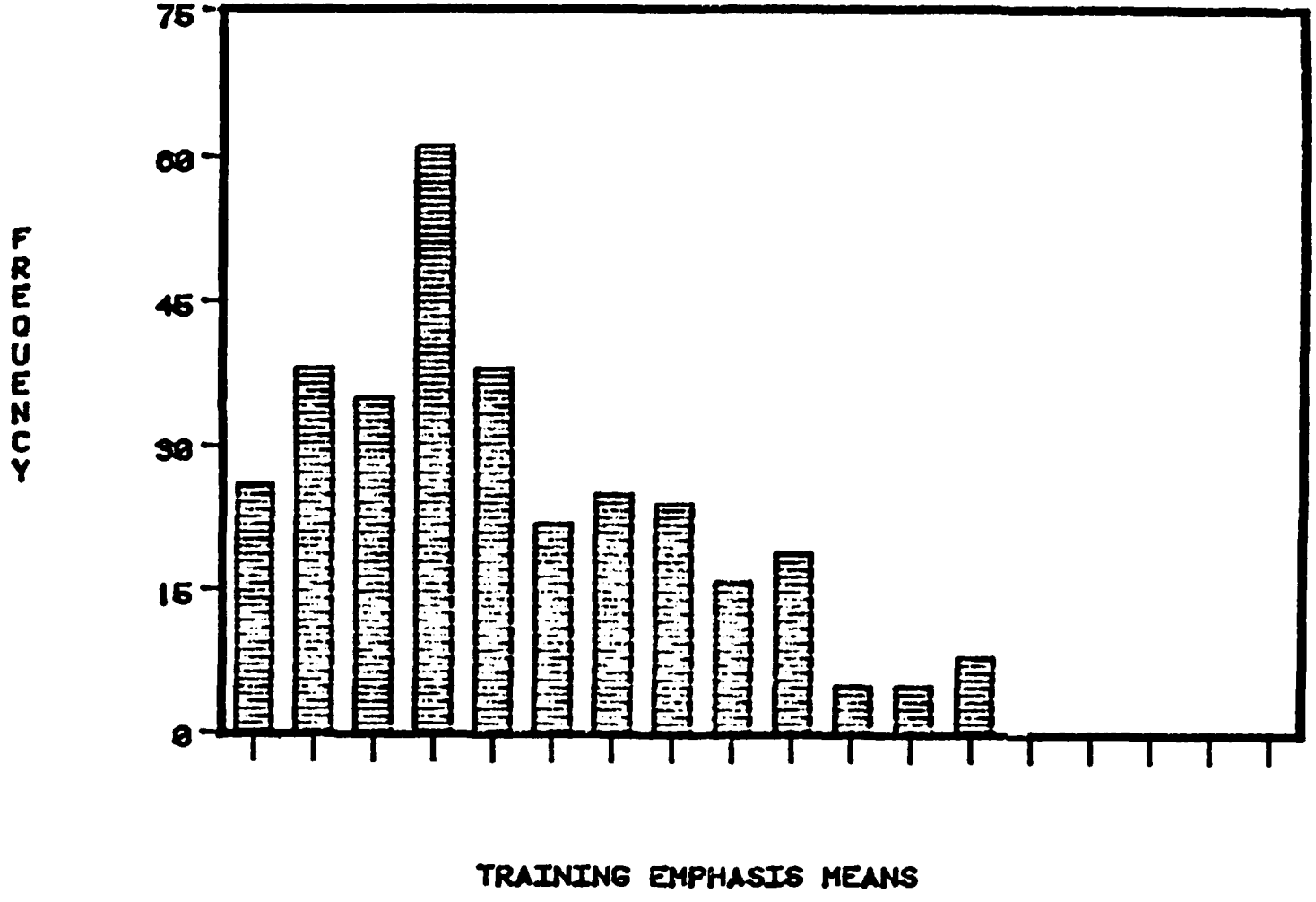

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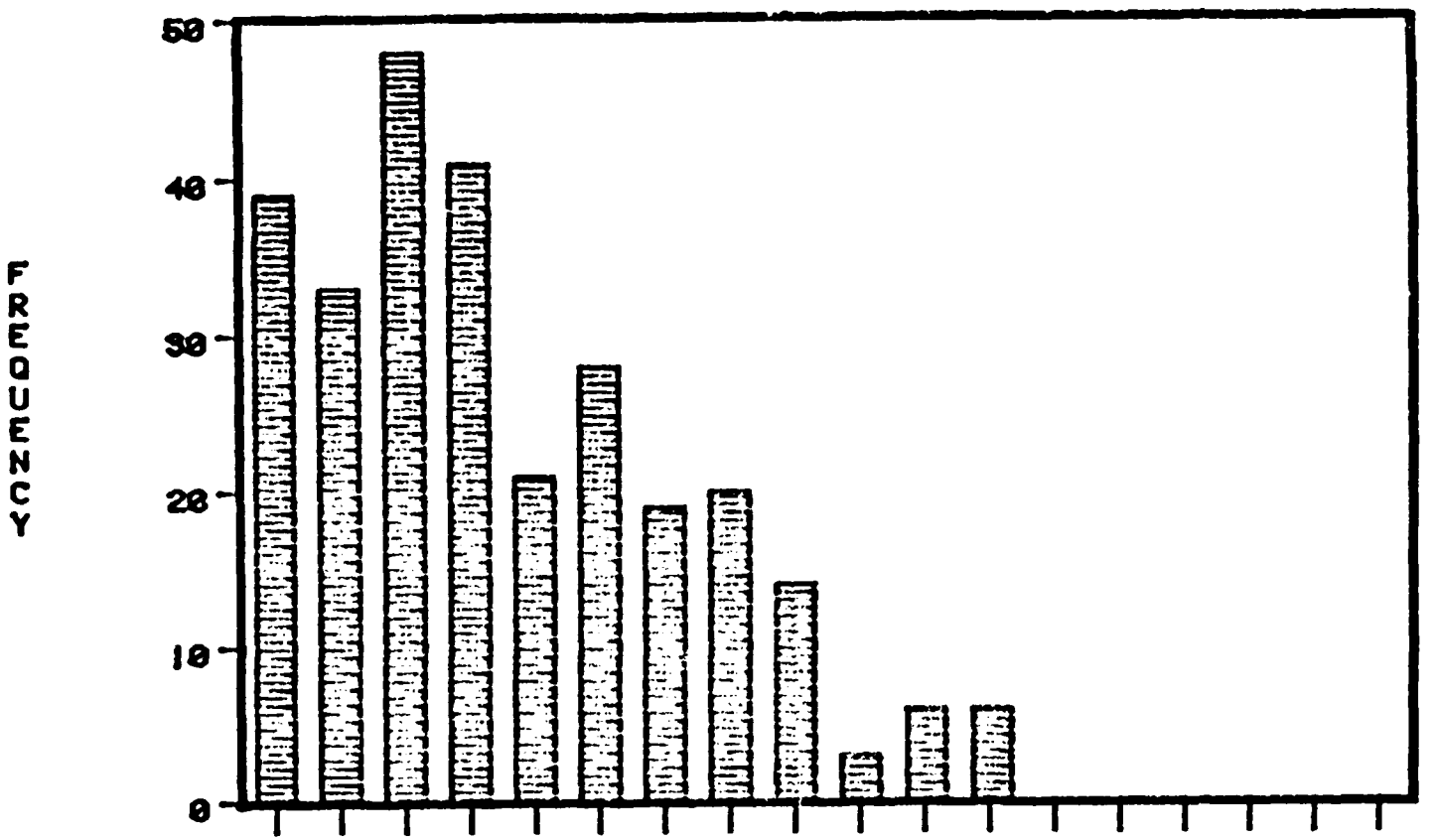

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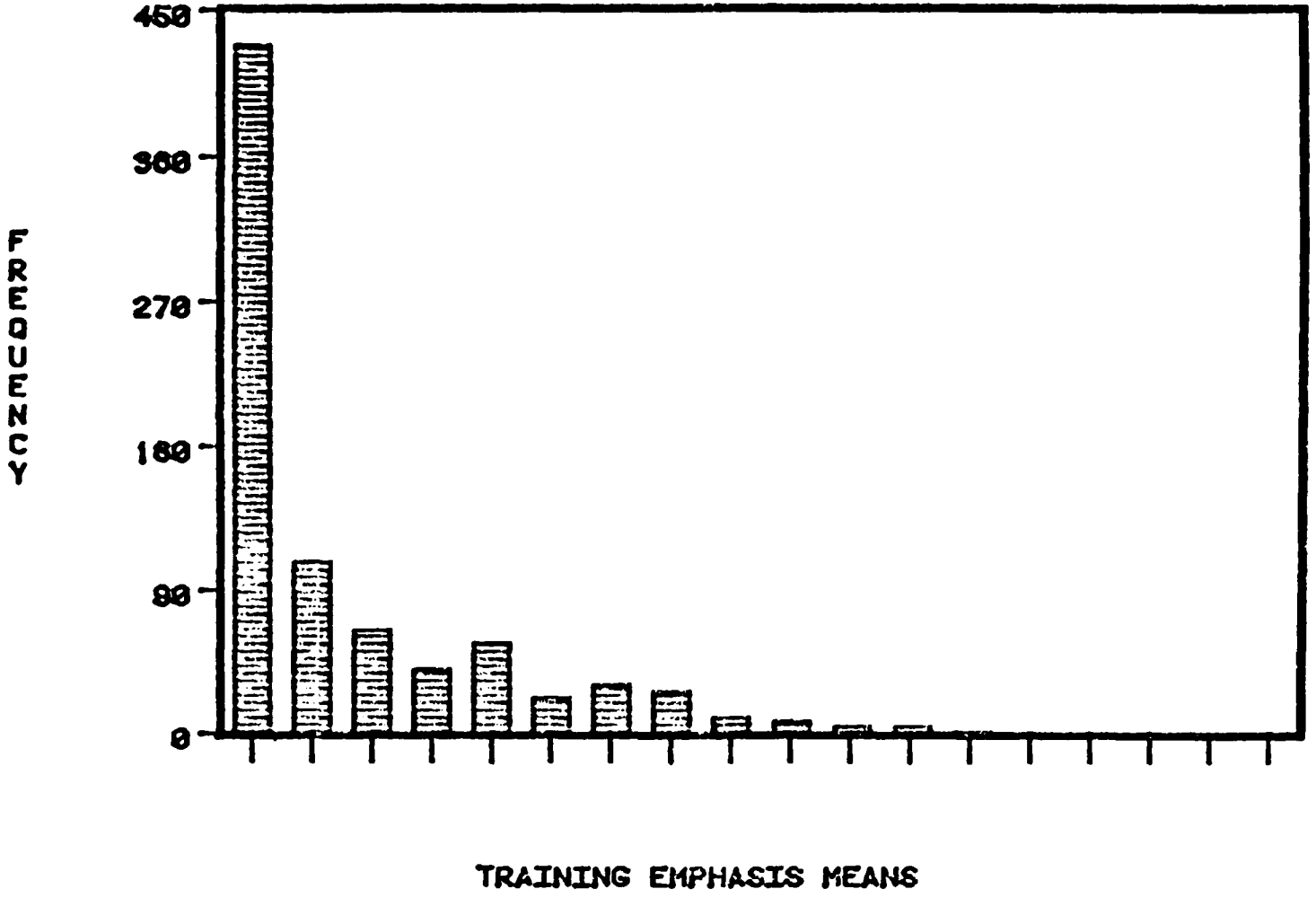

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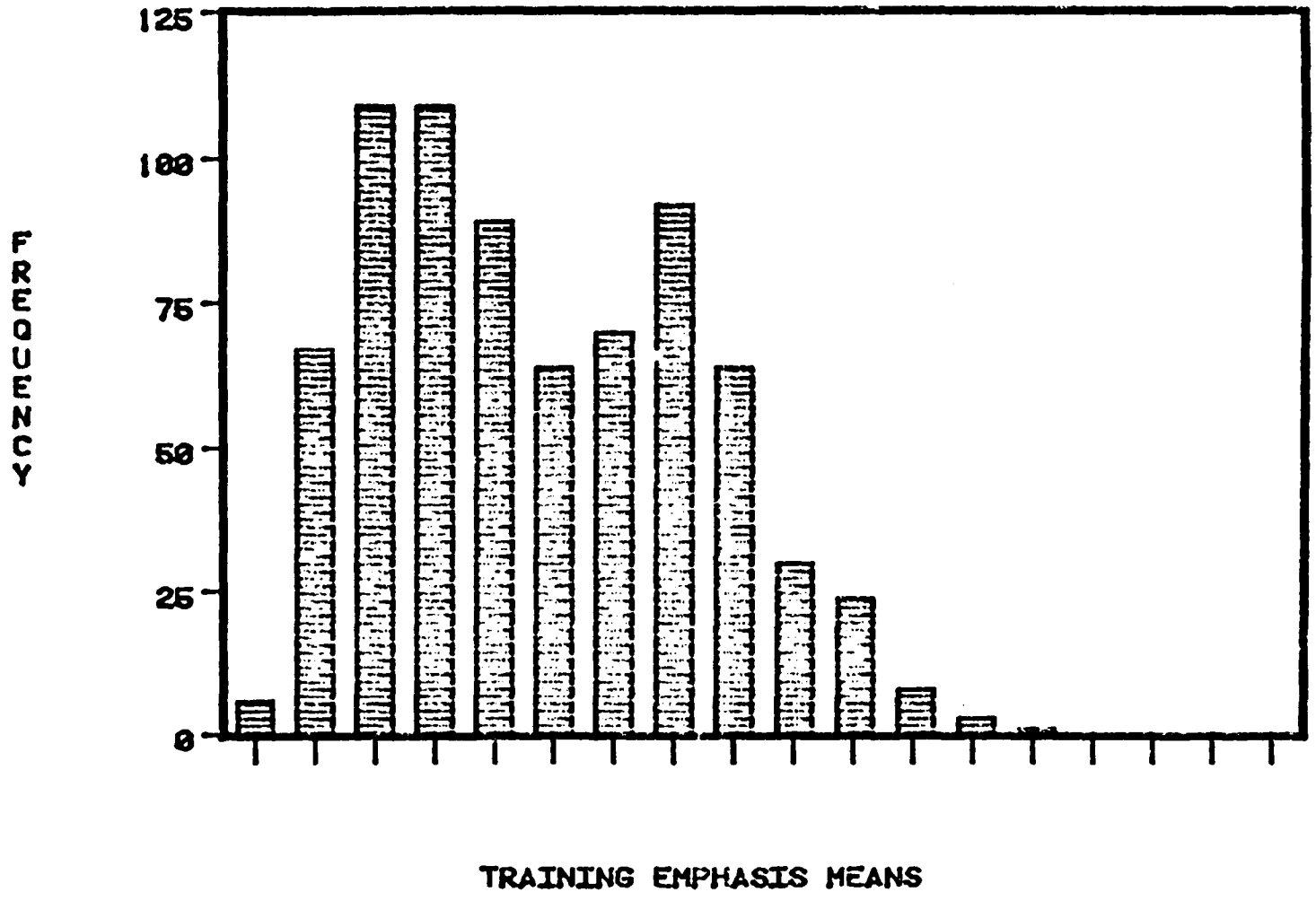

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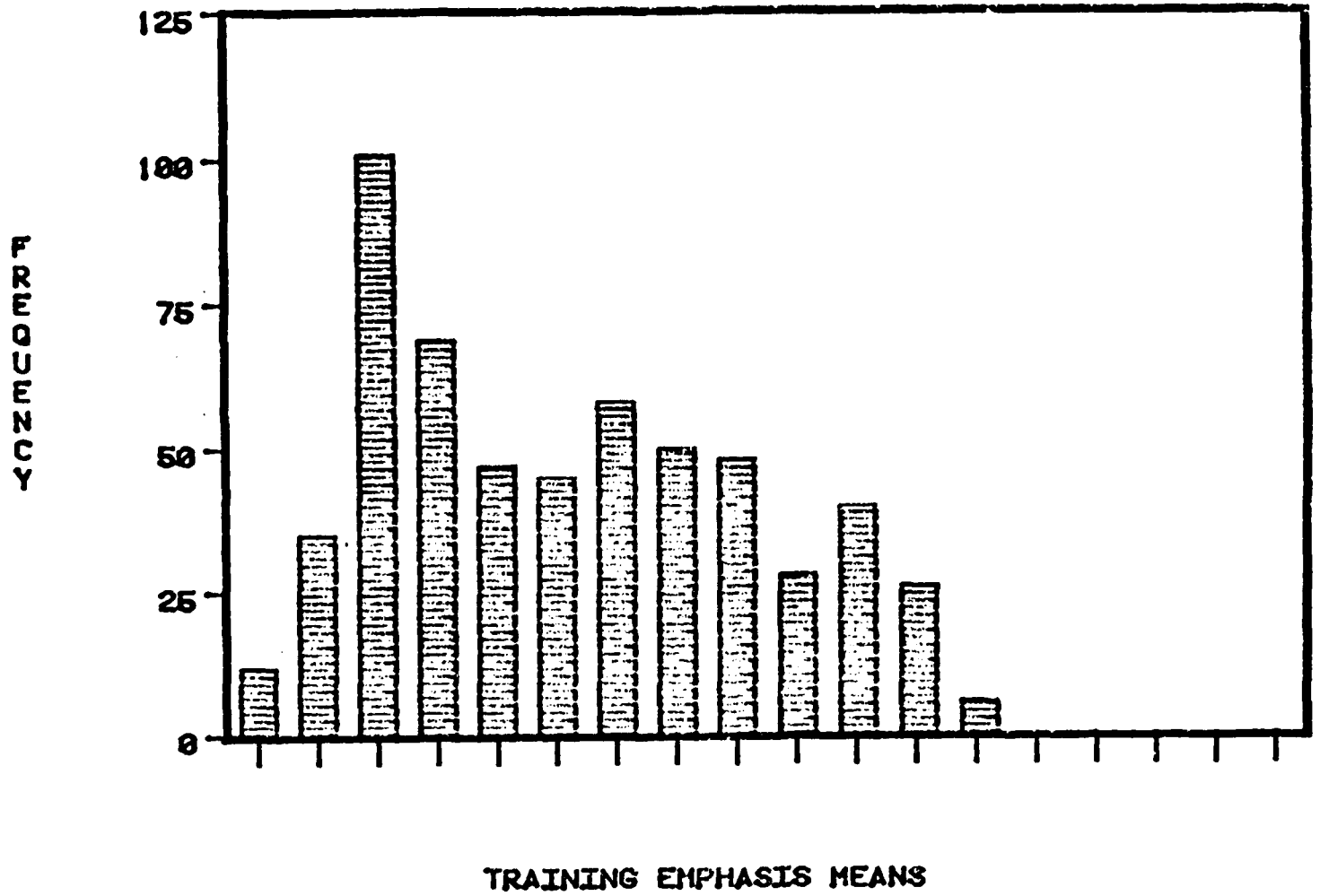

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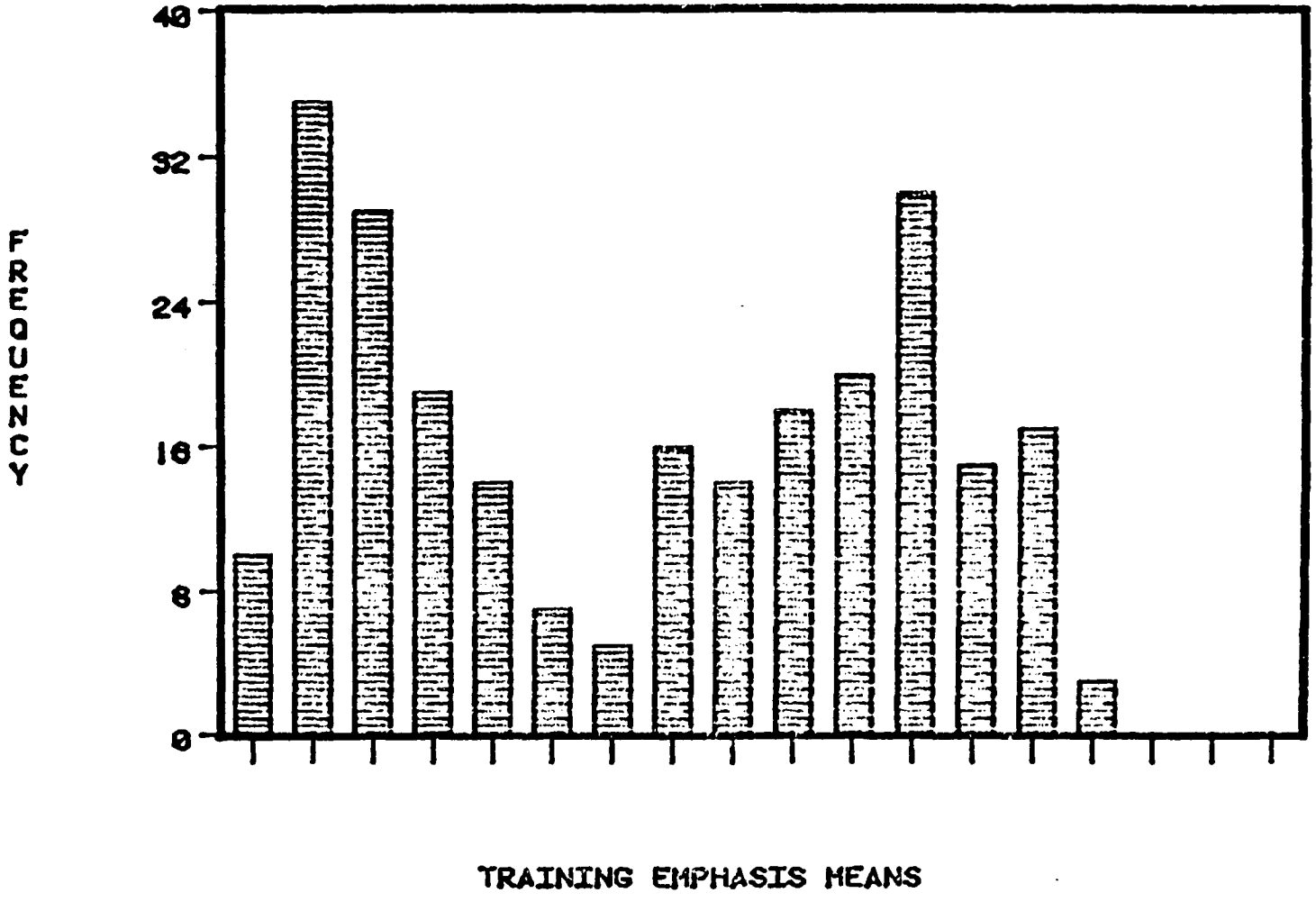

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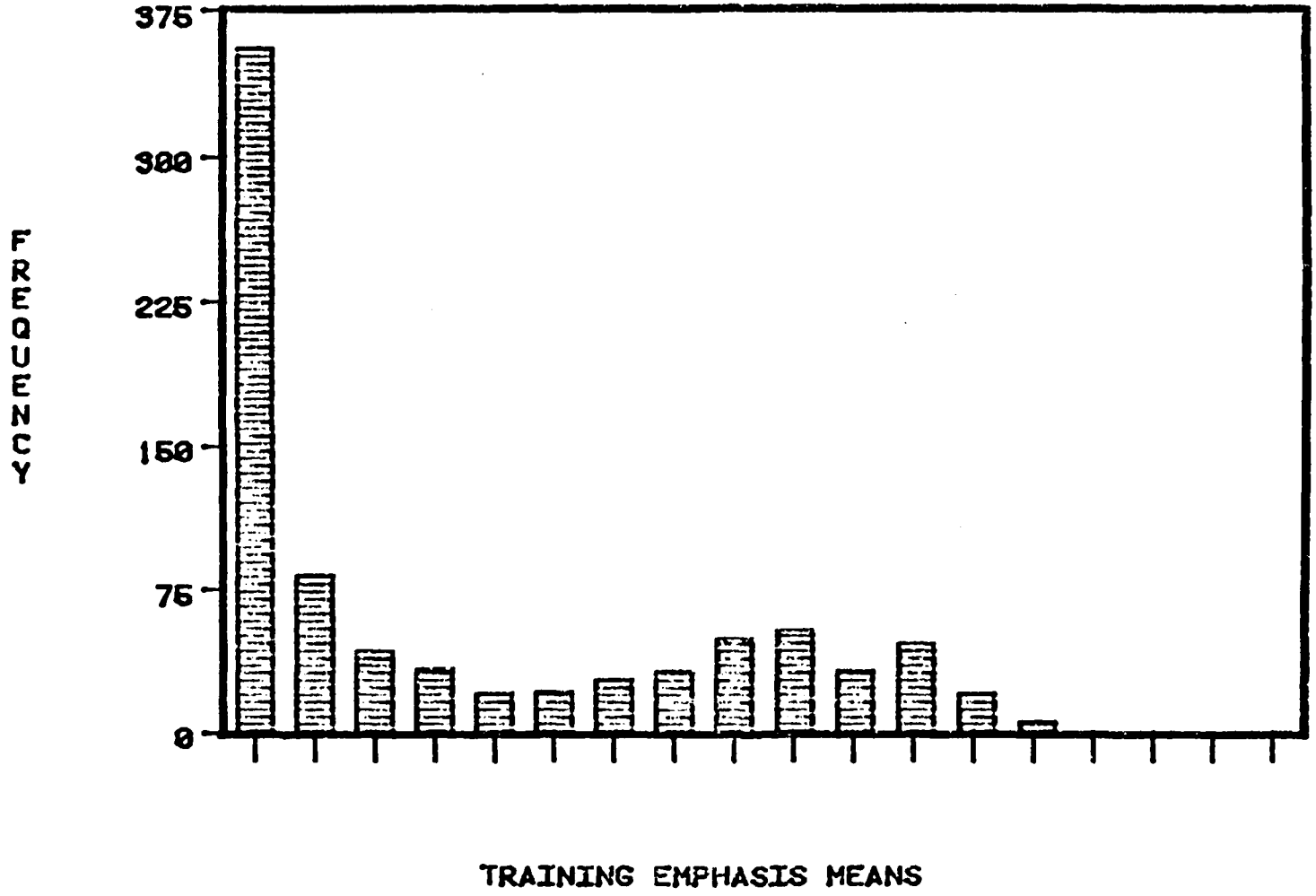

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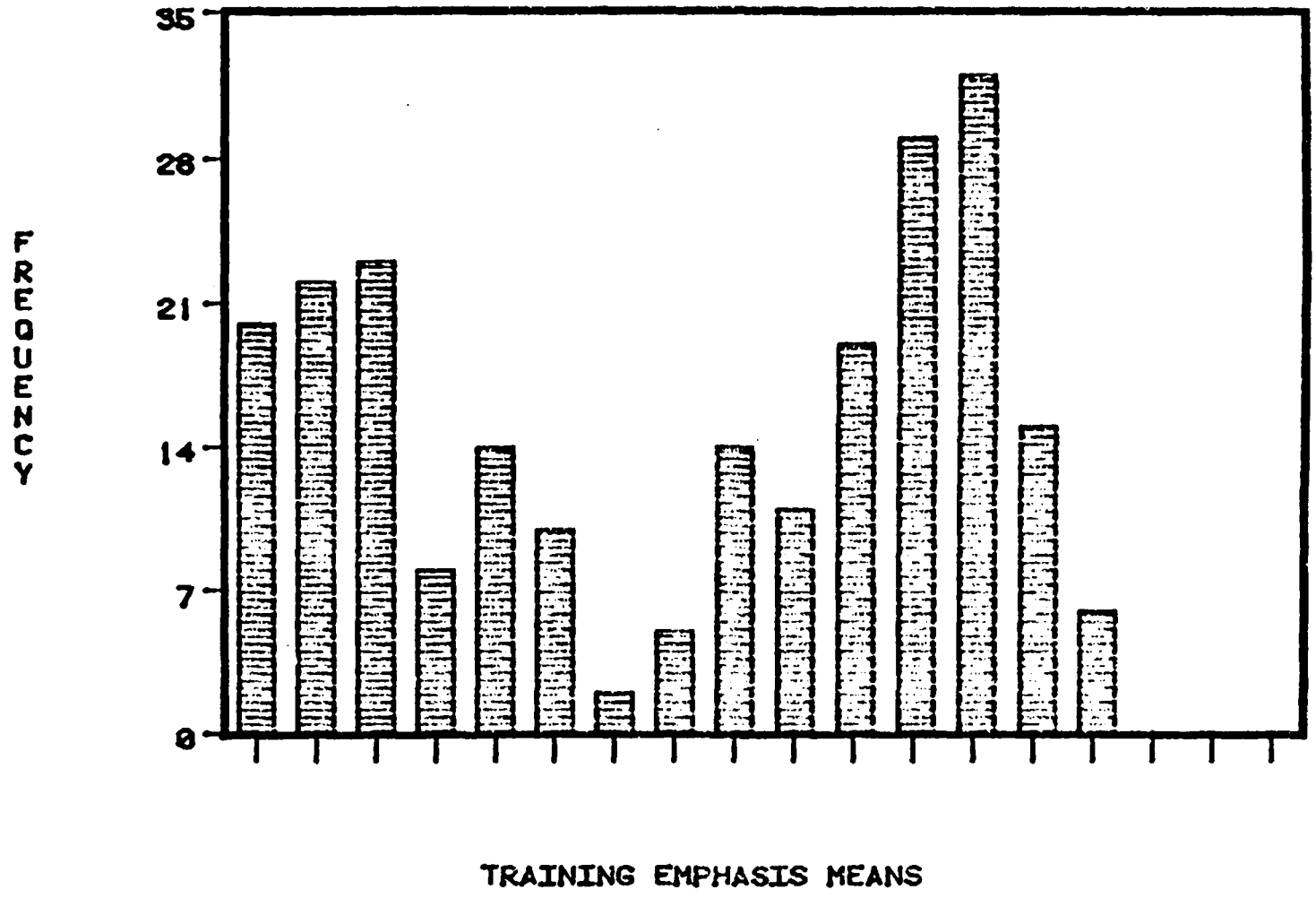

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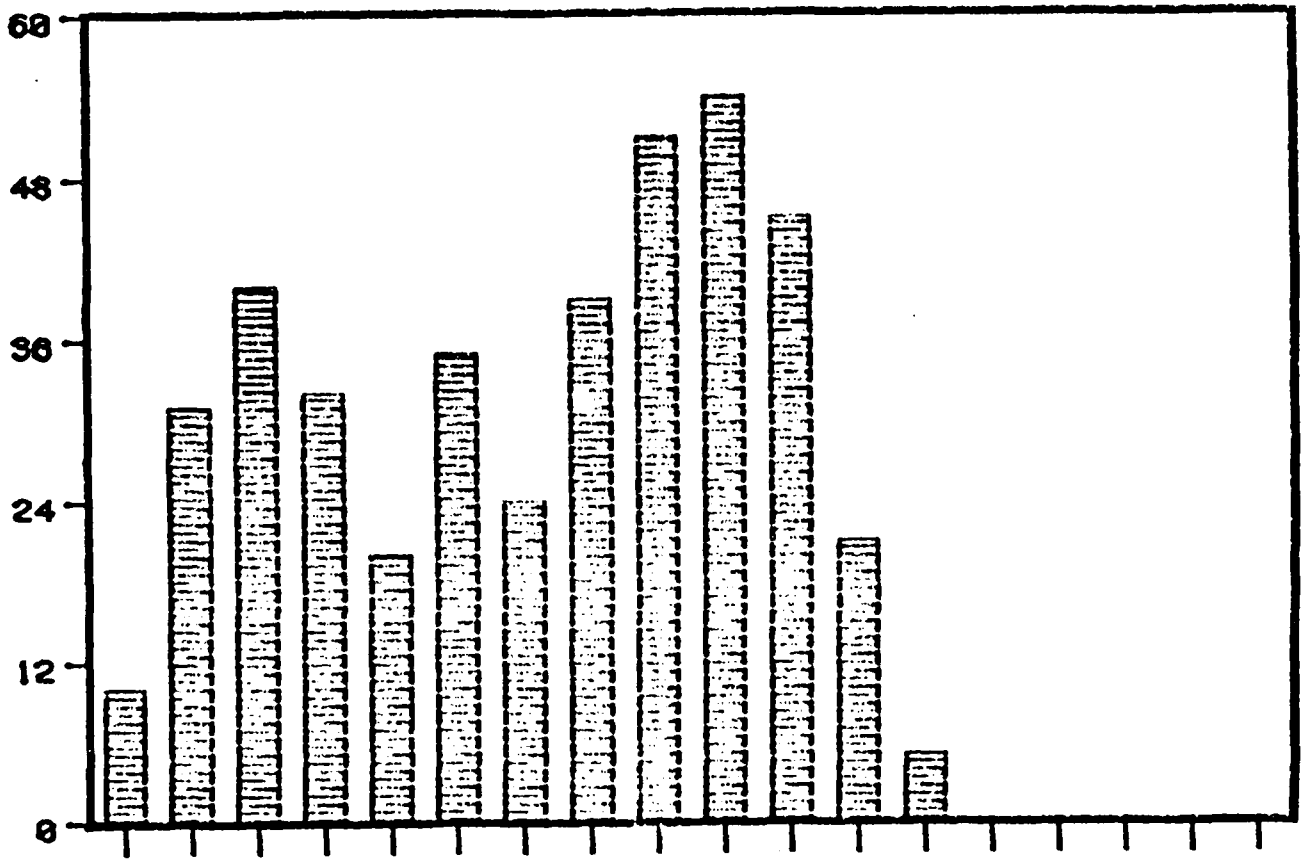

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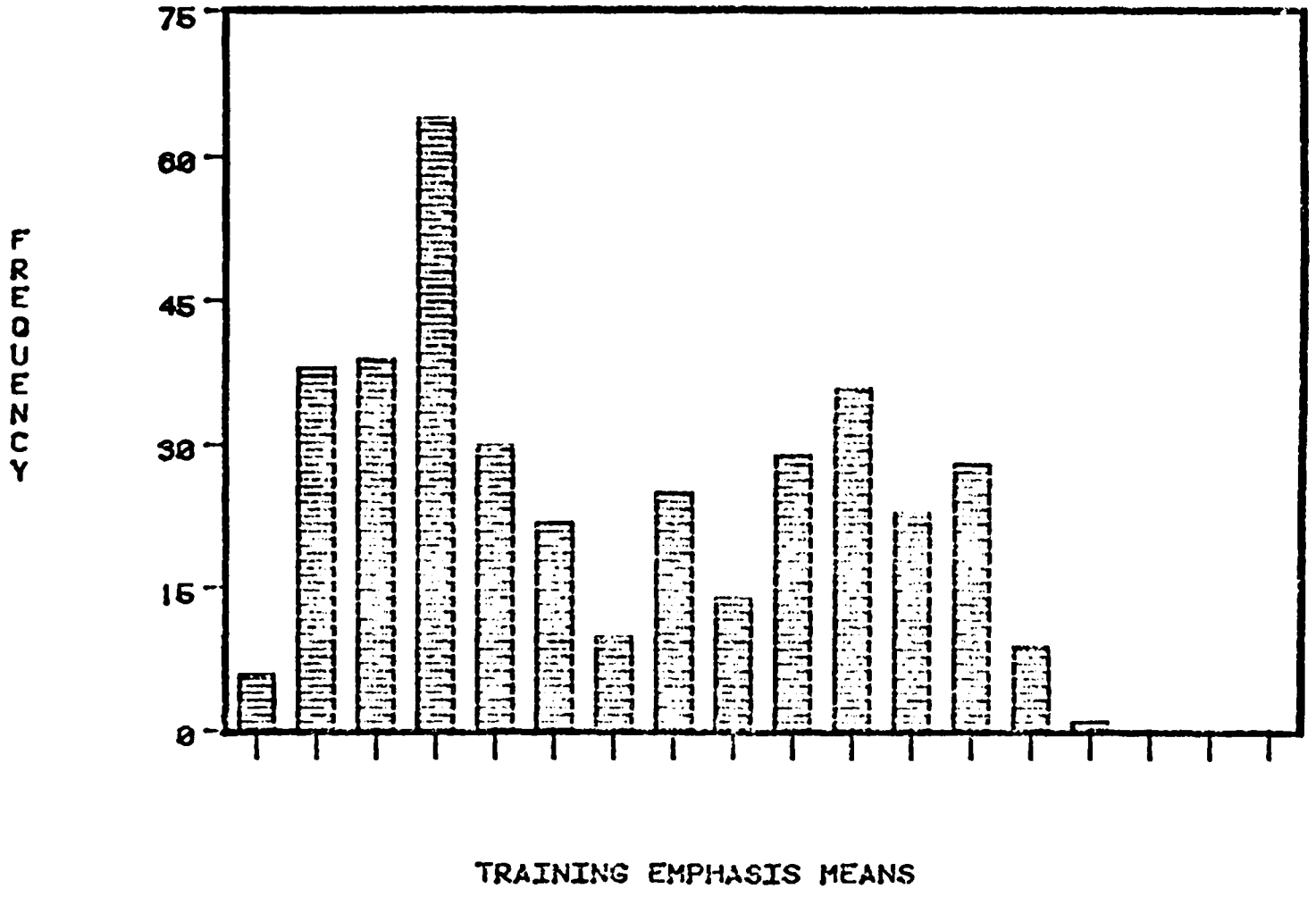

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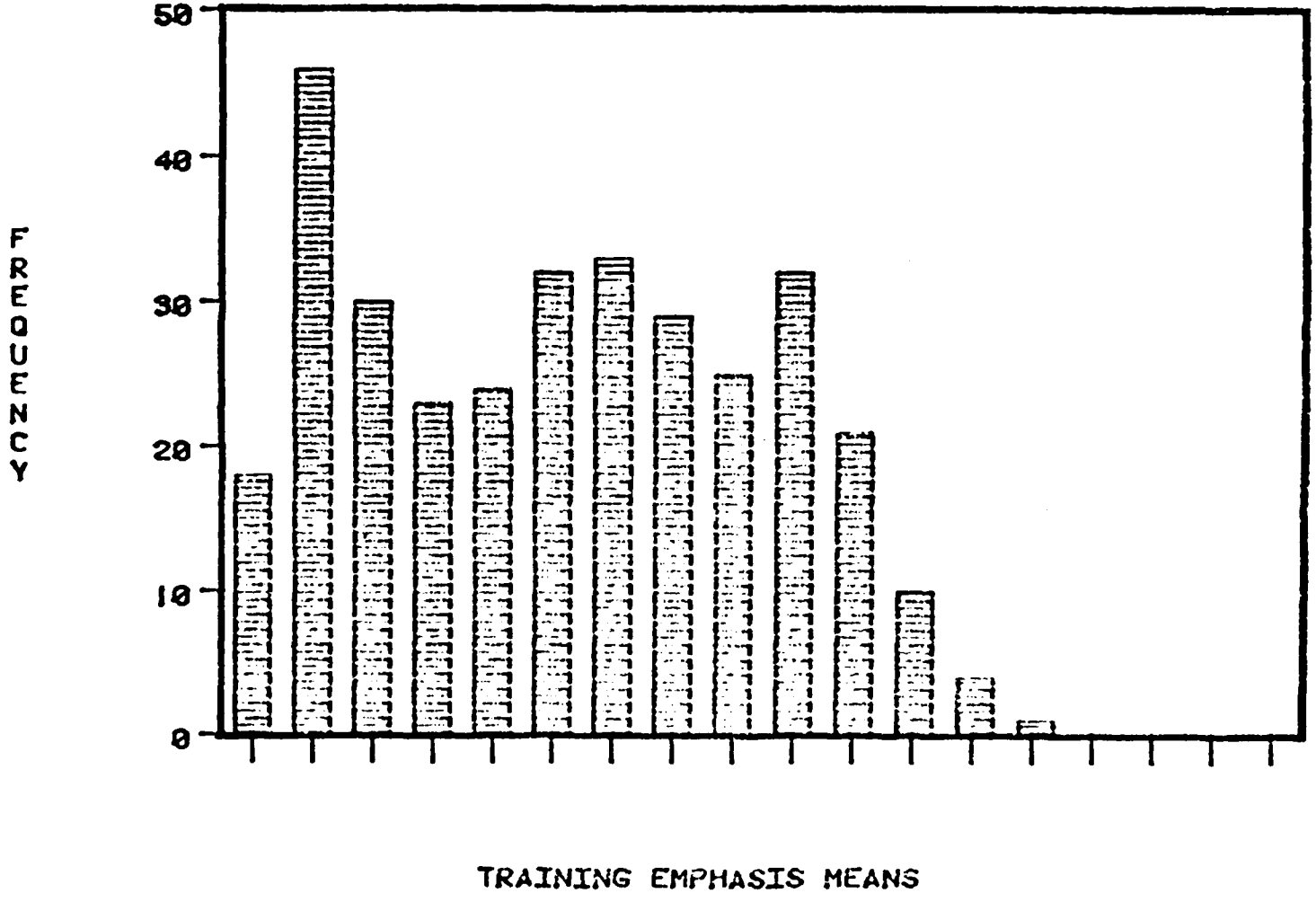

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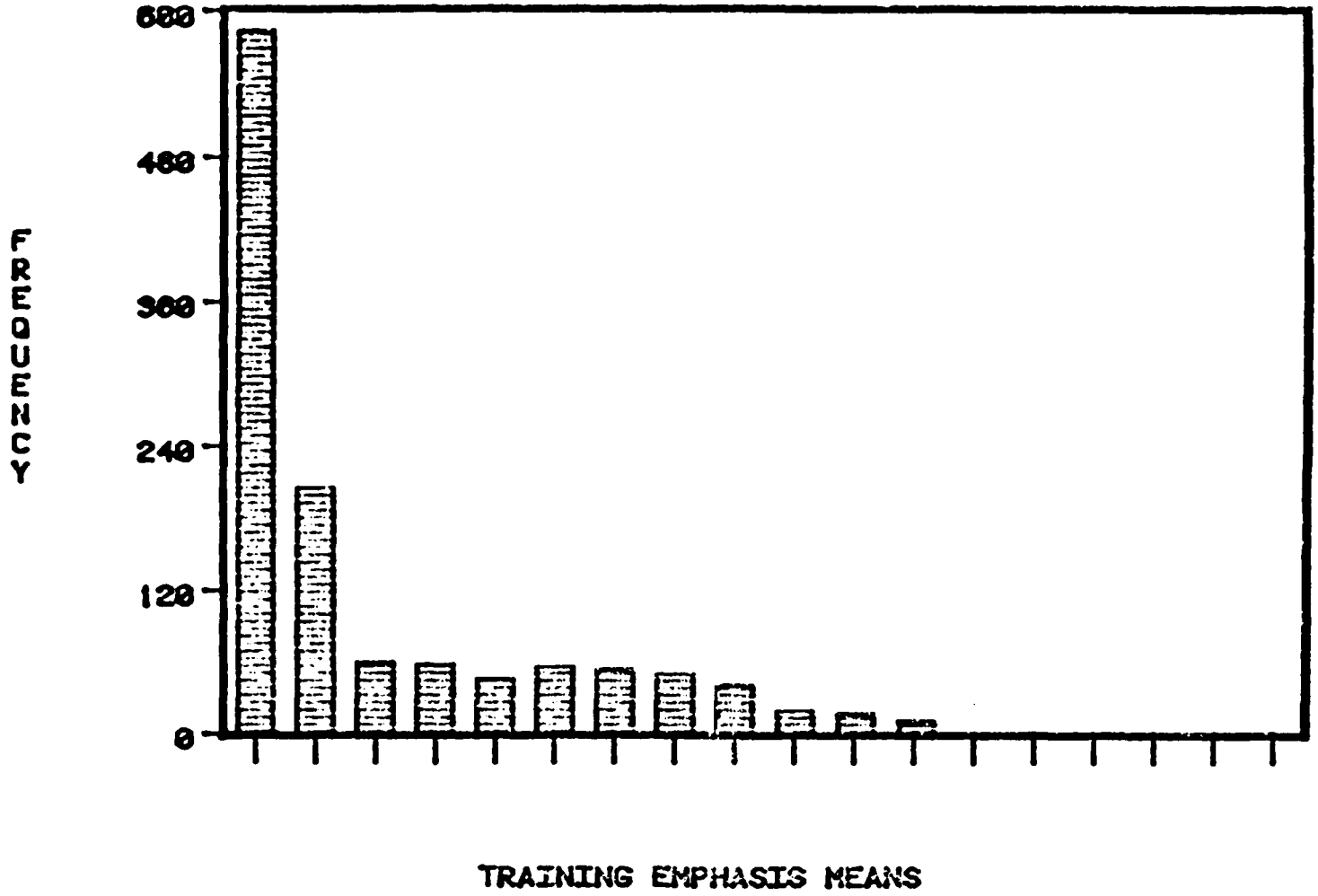

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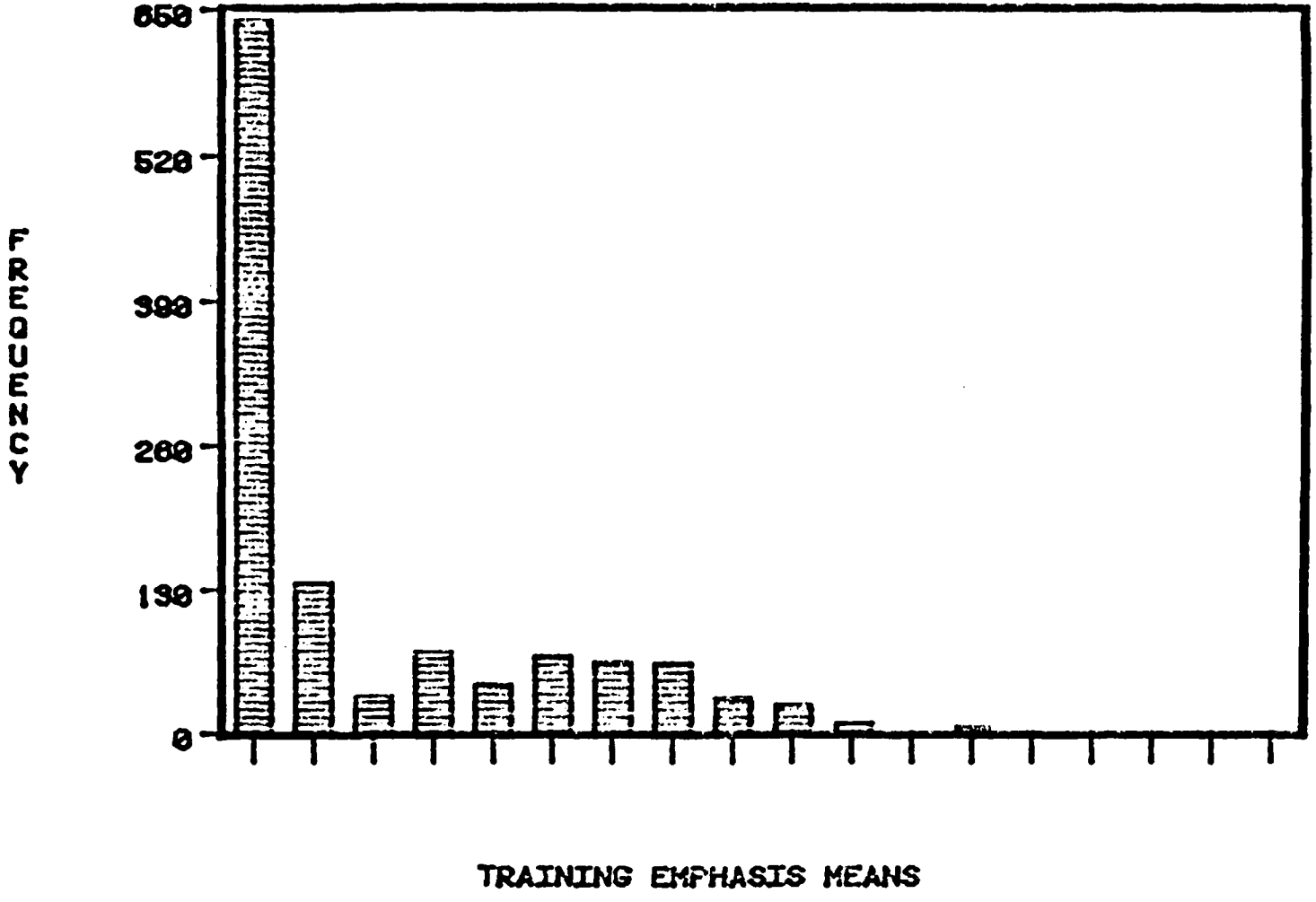

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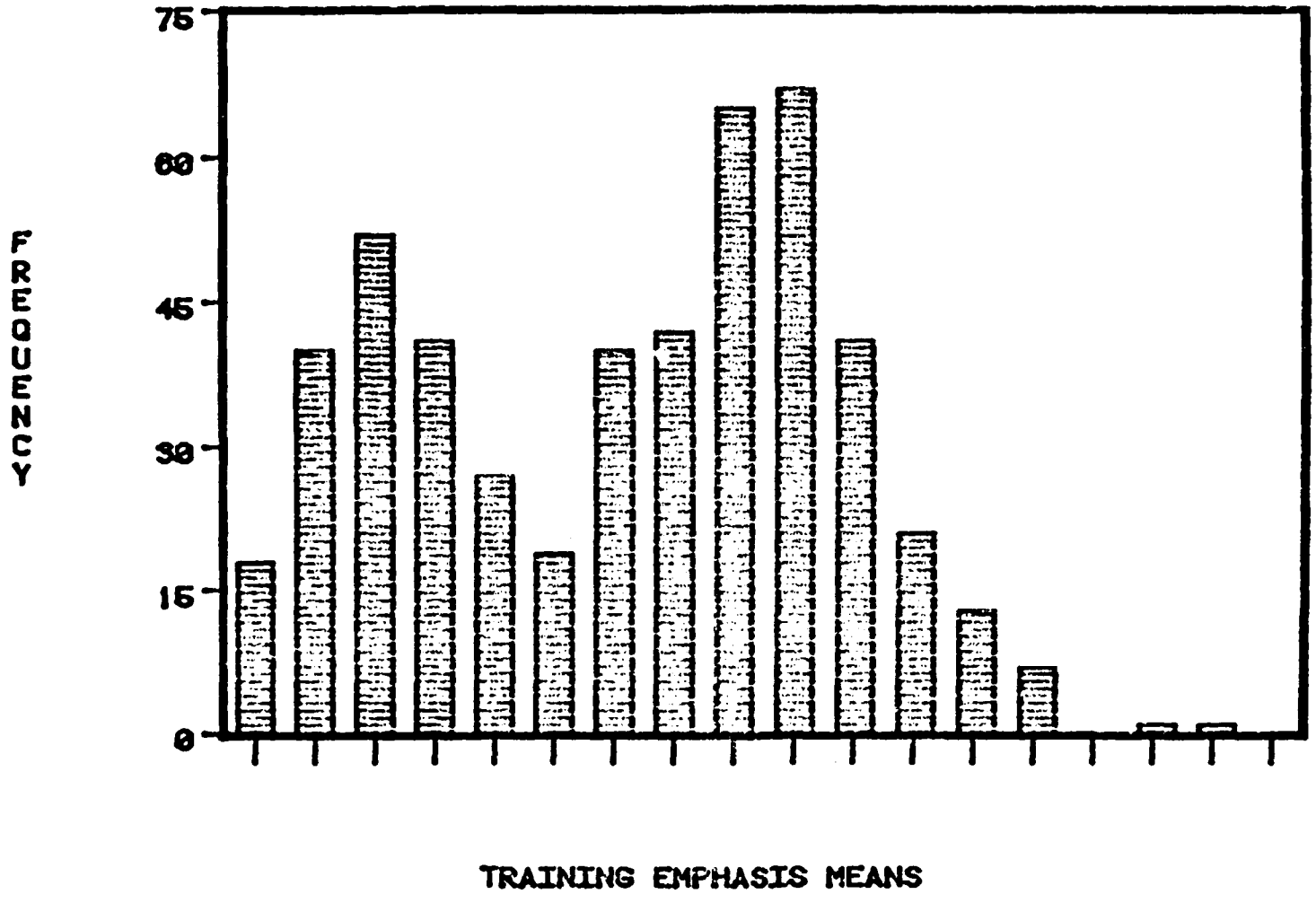

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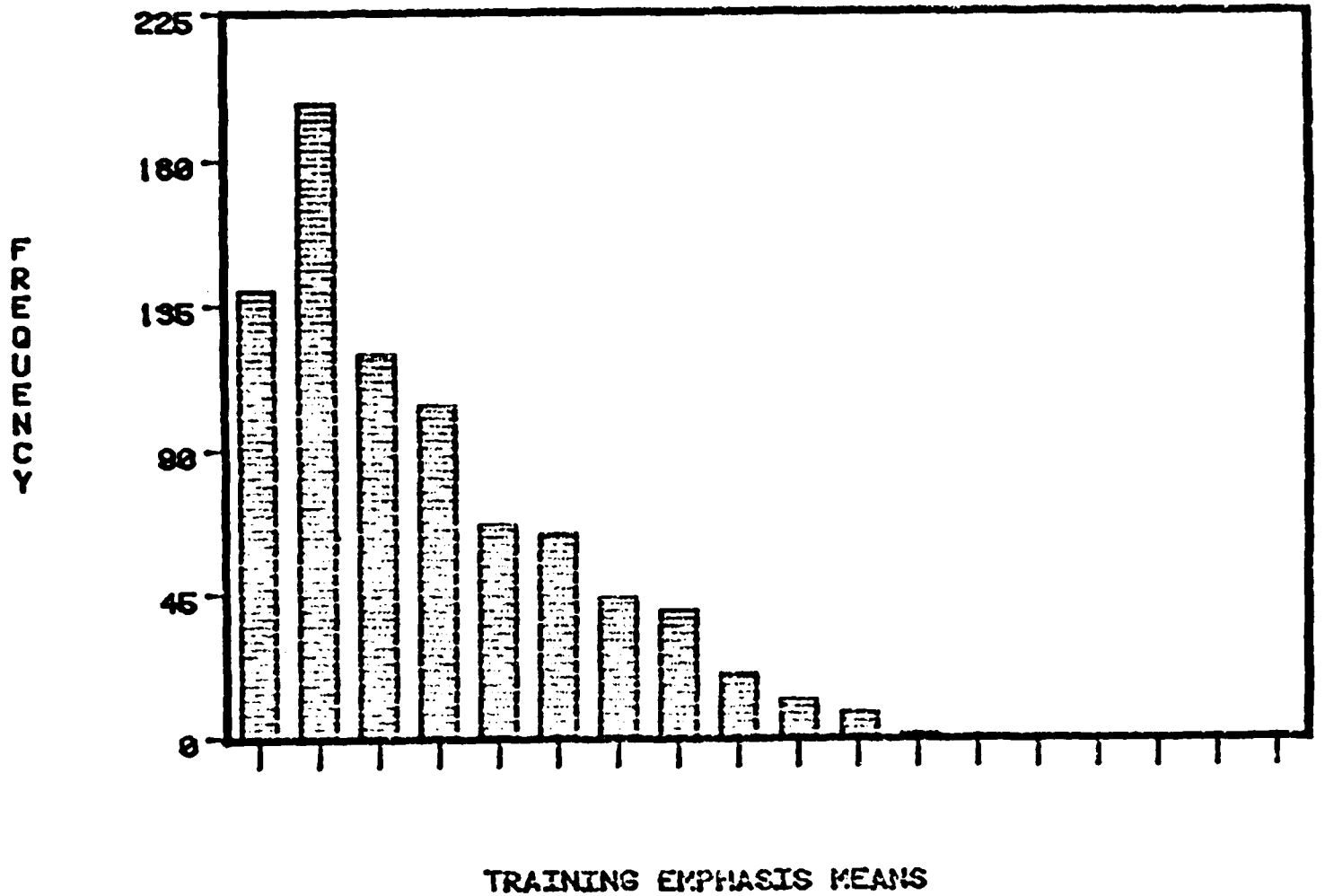

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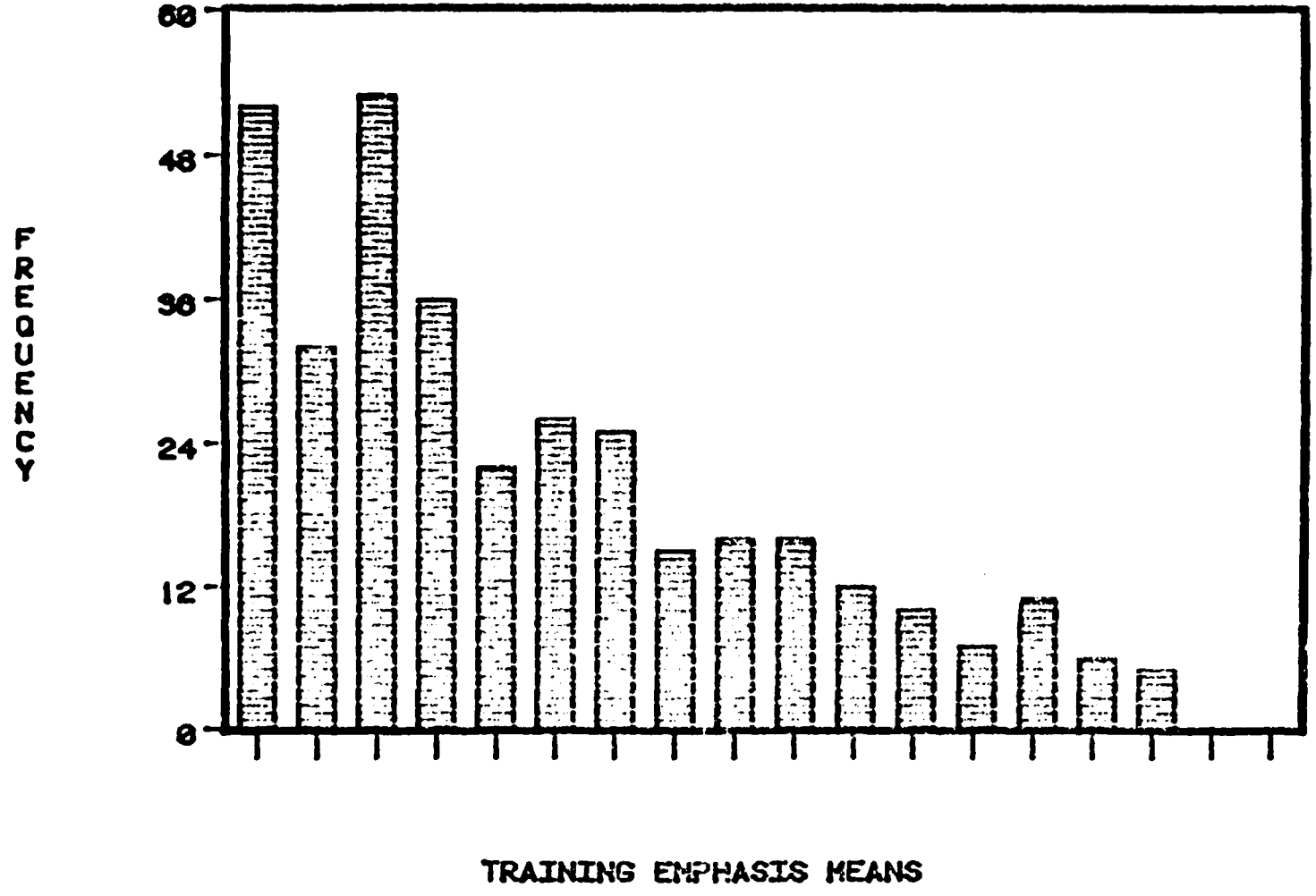

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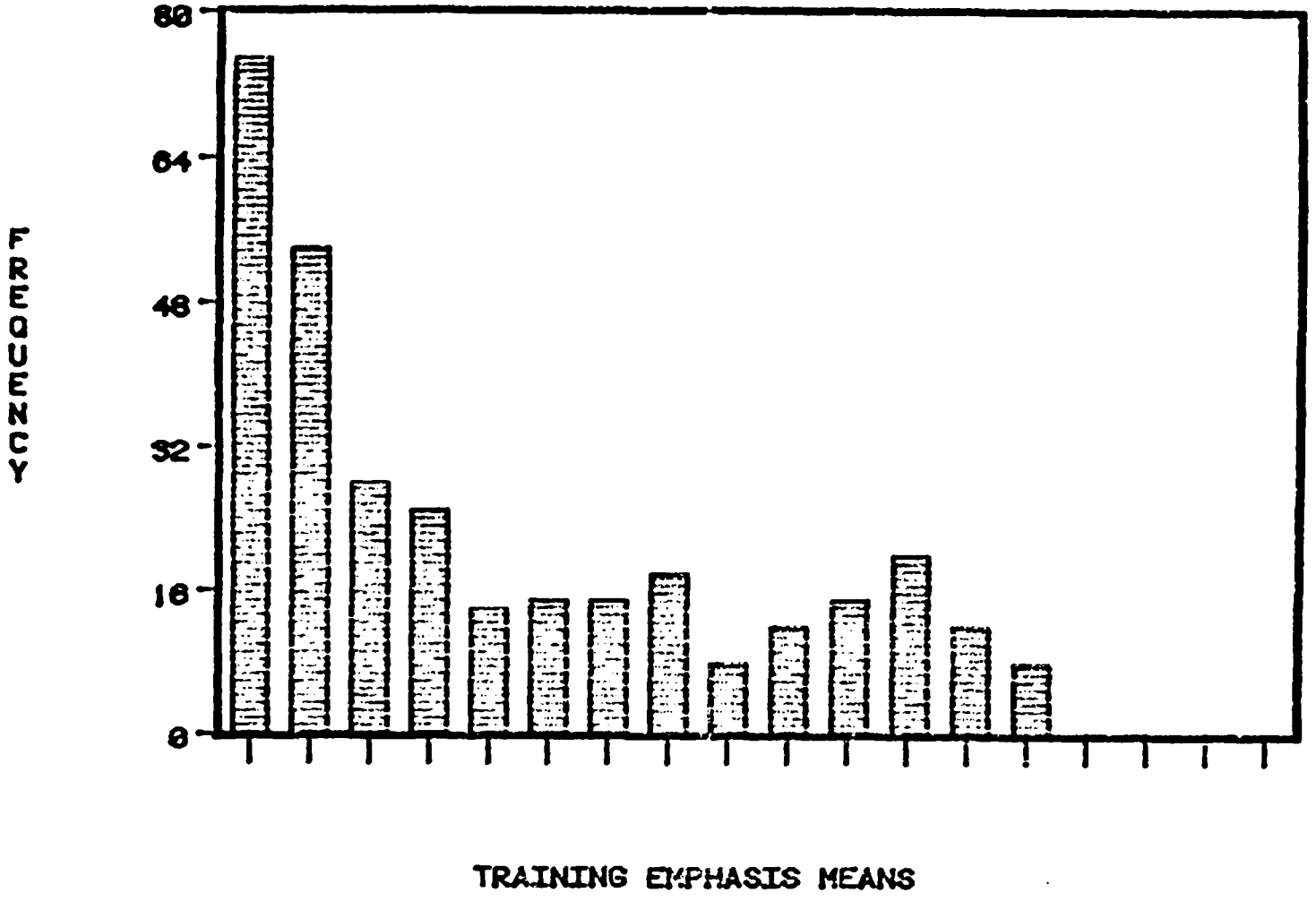

APPENDIX F: TASK FACTOR PRINTOUT ORDERED ON RECOMMENDED TRAINING EMPHASIS MEAN RATINGS

TASK	TITLE - AFS 292X3	PRE EMP	ACT EMP	DIF EMP	DIFF	DELAY	CONSEQ	PMP	TIME	AVGRADE
G 214	TAKE ACTIONS UPON RECEIPT OF EMERGENCY OR DISTRESS SIGNALS	6.72	7.00	-.271	7.74	1.41	4.31	41.0	.74	5.34
G 165	MAINTAIN WATCH ON DESIGNATED FREQUENCIES	5.86	5.50	.363	5.60	1.97	2.93	66.7	2.53	4.65
G 171	AUTHENTICATE STATIONS OR MESSAGE TRAFFIC USING CHALLENGE-AND-REPLY SYSTEMS	5.85	5.40	.245	5.78	2.00	3.49	67.9	1.35	5.53
G 194	OBTAIN OR TRANSMIT AIRCRAFT CLEARANCES AND ADVISORIES	5.82	5.83	-.014	6.69	1.95	3.63	33.3	1.03	5.57
G 193	MONITOR PRIMARY RADIO FREQUENCY	5.81	5.37	.442	5.56	1.92	2.83	67.6	2.42	5.34
G 201	PROCESS REQUESTS FOR ASSISTANCE, INFORMATION, OR INSTRUCTIONS FROM AIRCRAFT IN FLIGHT	5.74	5.63	.113	6.63	2.19	3.96	39.6	1.13	5.14
G 203	RELAY COMMUNICATIONS TRAFFIC BETWEEN FIXED STATIONS AND AIRCRAFT	5.67	5.16	.508	6.06	2.32	3.56	47.6	1.45	5.15
G 173	COORDINATE AIR-TO-GROUND TRAFFIC	5.41	5.23	.174	5.91	2.45	4.04	43.6	1.24	5.83
G 172	COMMUNICATE WITH OTHER STATIONS USING PRO-SIGN, PRO-WORDS, OR PHONETICS IN RADIO COMMUNICATIONS	5.35	5.97	-.622	4.60	2.18	3.62	73.6	2.45	4.60
G 216	TRANSCRIBE VOICE TRANSMISSIONS USING TYPEWRITERS	5.28	5.12	.166	4.80	2.46	3.62	44.7	1.34	4.45
G 169	MAKE VOICE CONTACTS AT SCHEDULED TIMES	5.27	4.97	.301	4.71	2.10	2.74	72.9	2.30	4.53
G 166	MAKE PHONE PATCHES	5.24	5.76	-.538	4.61	2.22	3.16	77.3	2.64	5.15
G 167	MAKE RECEIVER CHANGES OR ADJUSTMENTS TO REDUCE INTERFERENCE	5.23	5.10	.135	4.77	2.57	3.39	46.7	1.20	4.50
G 160	IDENTIFY INCOMING CALLS USING CALL SIGN LIST	5.12	4.90	.211	4.97	2.76	3.36	47.8	1.17	4.53
G 190	MONITOR NET SECURITY	5.09	4.36	.728	5.26	2.64	3.36	37.0	.96	5.45
G 217	TRANSCRIBE VOICE TRANSMISSIONS BY HAND	5.01	5.13	-.118	4.80	2.74	3.74	41.4	1.16	4.70
F 131	ADJUST RECEIVERS TO OBTAIN READABLE SIGNALS	4.99	5.38	-.391	4.53	2.49	3.29	47.3	1.37	5.00
F 142	COORDINATE TRAFFIC WITH OTHER AGENCIES OR UNITS, SUCH AS AIR TRAFFIC CONTROL, OR AIRBORNE COMMAND POSTS	4.96	4.77	.192	5.78	2.42	3.83	34.2	1.02	4.29
G 170	AUTHENTICATE STATIONS OR MESSAGE TRAFFIC USING "BUILT-IN" AUTHENTICATION SYSTEMS	4.95	4.28	.675	5.37	2.38	3.33	25.3	.57	5.44
F [illegible]	TUNE OR CHANGE TRANSCEIVER FREQUENCIES MANUALLY	4.89	5.42	-.531	4.74	2.92	3.78	45.8	1.41	4.17
[illegible]	MAINTAIN POSITION OR CIRCUIT LOGS	4.82	5.19	-.363	4.40	2.89	3.02	64.1	2.12	4.02
F 152	TUNE OR CHANGE RECEIVER FREQUENCIES MANUALLY	4.80	5.21	-.406	4.57	3.03	3.47	45.4	1.32	[illegible]
G 227	POST OR REROUTE AIRCRAFT MOVEMENT MESSAGES	4.74	4.56	.182	5.97	2.53	3.57	21.2	.56	5.53
G 213	SEND POSITION REPORTS	4.69	5.02	-.330	5.97	2.33	3.32	15.3	.45	6.27
E 117	MAINTAIN PHONE PATCH RECORDS	4.68	4.41	.264	3.56	3.06	2.06	55.2	1.70	4.65
E 104	LOG INCOMING OR OUTGOING MESSAGES	4.65	4.79	-.133	4.14	3.05	2.73	62.3	2.15	3.99
G 192	MONITOR OR PATCH RADIO TELETYPE TRAFFIC THROUGH HIGH FREQUENCY (HF) EQUIPMENT	4.64	4.55	.100	4.74	2.03	3.63	26.6	.55	5.80
F 144	OPERATE ROTATING ANTENNA EQUIPMENT FOR MAXIMUM SIGNAL STRENGTH	4.64	4.66	-.038	4.49	3.13	3.26	51.6	1.30	3.53
E 116	MAINTAIN MASTER STATION LOGS	4.64	3.70	.933	4.51	3.25	3.28	44.3	1.15	4.75
G 191	MONITOR OR MAINTAIN FREQUENCY STANDARDS OF STATIONS	4.62	3.61	1.012	4.51	3.06	3.53	35.5	.94	4.80
[illegible] 199	OPERATE STANDARD COMMUNICATIONS RECEIVERS	4.59	5.08	-.495	4.71	3.27	3.39	40.3	1.09	5.42
[illegible]	REPORT INTERFERENCE CAUSED BY JAMMING	4.54	4.18	.359	4.60	2.97	3.66	[illegible]	.45	[illegible]
[illegible] 112	MAINTAIN LOGS OF AIRCRAFT TRANSMISSIONS OR [illegible]	4.54	4.22	.321	4.72	3.31	3.22	40.7	1.45	5.73
G [illegible]	OPERATE FIXED GROUND TRANSCEIVERS	4.51	4.90	-.393	4.91	3.18	3.62	36.6	1.15	3.35

PRE EMP - [illegible] TRAINING EMPHASIS
ACT EMP - [illegible]
DIF EMP - DIFFERENCE BETWEEN PREDICTED AND MEAN TRAINING EMPHASIS
DIFF - [illegible]
DELAY - [illegible]

CONSEQ - PROBABLE CONSEQUENCE OF INADEQUATE PERFORMANCE
PMP - PERCENT MEMBERS PERFORMING (2-24 MOS)
TIME - PERCENT TIME SPENT (2-24 MOS)
AVGRADE - AVERAGE PERCENT GRADE

APPENDIX G: MATCHING OF STS TASKS WITH TRAINING FACTOR RATINGS

STS	STS TASK - AFS 293X3	Recommended Training Emphasis	% Performing First Job	Task Difficulty
1	CAREER PROGRESSION			
1A	AIRMAN COMMUNICATIONS OPERATIONS CAREER FIELD			
B	23 COUNSEL SUBORDINATES ON CAREER PROGRESSION	1.34	5.5	5.05
1B	PROGRESSION IN CAREER LADDER 293X3			
B	23 COUNSEL SUBORDINATES ON CAREER PROGRESSION	1.34	5.5	5.05
1C	CAREER MOTIVATION			
B	23 COUNSEL SUBORDINATES ON CAREER PROGRESSION	1.34	5.5	5.05
2	SECURITY			
2A	COMMUNICATIONS SECURITY (COMSEC)			
A	1 CATEGORIZE INFORMATION AS TOP SECRET, SECRET, CONFIDENTIAL, OR FOR OFFICIAL USE ONLY	2.36	18.7	6.25
B	39 IMPLEMENT PROCEDURES FOR DOCUMENT SECURITY OR CONTROL	1.75	6.2	5.76
E	126 STORE, RESEARCH, OR MAINTAIN INVENTORY LISTS OF CLASSIFIED DOCUMENTS	3.16	27.1	5.41
G	170 AUTHENTICATE STATIONS ON MESSAGE TRAFFIC USING "KOI-18" AUTHENTICATION SYSTEMS	4.28	25.3	4.36
G	171 AUTHENTICATE STATIONS ON MESSAGE TRAFFIC USING CHALLENGE-AND-REPLY SYSTEMS	5.60	57.9	4.23
G	177 ENCODE OR DECODE MESSAGES MANUALLY	5.07	31.5	5.16
G	190 MONITOR NET SECURITY	4.36	37.0	3.78

APPENDIX H: EXECUTIVE SUMMARY MATCHING OF STS AREAS WITH TRAINING FACTOR RATINGS

STS	STS AREA - AFS 293X3	Number of Tasks	Recommended Training Emphasis	% Performing First Job	Task Difficulty
1	CAREER PROGRESSION	0.	.00	.0	.00
1A	AIRMAN COMMUNICATIONS OPERATIONS CAREER FIELD	1.	1.34	5.5	5.05
1B	PROGRESSION IN CAREER LADDER 293X3	1.	1.34	5.5	5.05
1C	CAREER MOTIVATION	1.	1.34	5.5	5.05
2	SECURITY	0.	.00	.0	.00
2A	COMMUNICATIONS SECURITY (COMSEC)	7.	3.80	29.1	4.99
2B	OPERATIONS SECURITY (OPSEC)	1.	1.75	6.2	5.76
3	SUPERVISION AND TRAINING	0.	.00	.0	.00
3A	SUPERVISION	6.	1.18	10.6	5.74
3A1	EVALUATE PERFORMANCE OF PERSONNEL AND COMPLETE APPROPRIATE RATING FORMS	3.	1.09	4.3	5.66
3A2	ORIENT NEWLY ASSIGNED PERSONNEL TO THE ORGANIZATION AND MISSION OF THE UNIT.	4.	1.52	9.1	4.78
3A3	INITIATE CORRESPONDENCE & SOPS CONCERNING RADIO ASSIGNMENTS	11.	1.85	12.5	5.22
3A4	ESTABLISH PRIORITIES AND SCHEDULE WORK ASSIGNMENTS	14.	1.55	10.0	5.22
3A5	SUPERVISE RADIO OPERATING ACTIVITIES	37.	1.50	8.4	5.37
3B	TRAINING	5.	1.24	10.8	5.67
3B1	EVALUATE PERSONNEL TRAINING NEEDS	3.	1.23	3.7	5.11
3B2	RECOMMEND PERSONNEL FOR TRAINING	6.	1.12	9.0	4.75
3B3	PLAN, CONDUCT AND SUPERVISE OJT	13.	1.43	9.0	5.14
3B4	PREPARE JOB PROFICIENCY GUIDES	3.	1.71	5.1	5.95
3B5	MOTIVATE TRAINERS AND TRAINEES	2.	.95	3.5	4.72
3B6	COUNSEL TRAINEES ON TRAINING PROGRAMS	1.	3.36	14.3	5.28
3B7	MONITOR EFFECTIVENESS OF OJT	6.	1.76	7.3	5.01
3B8	MAINTAIN TRAINING RECORDS	4.	1.49	11.6	4.78
3B9	EVALUATE EFFECTIVENESS OF TRAINING PROGRAMS	3.	.84	5.0	5.28
4	COMMUNICATIONS AGENCIES, SYSTEMS/FACILITIES, PUBLICATIONS & RECORDS	0.	.00	.0	.00
4A	COMMUNICATIONS AGENCIES	0.	.00	.0	.00
4B	COMMUNICATIONS SYSTEMS/FACILITIES	12.	2.88	14.0	5.13
4C	COMMUNICATIONS PUBLICATIONS	7.	2.70	13.8	5.21
4D	COMMUNICATIONS RECORDS	24.	2.82	25.8	3.61
5	OPERATIONAL INSPECTIONS	0.	.00	.0	.00
5A	PERFORM INSPECTIONS OF HF, VHF AND UHF RADIO EQUIPMENT	2.	3.78	20.5	4.98
5B	DETECT AND REPORT EQUIPMENT PROBLEMS TO THE APPROPRIATE MAINTENANCE SUPPORT ACTIVITY	2.	2.47	15.8	4.31
6	EQUIPMENT TUNING AND OPERATION	0.	.00	.0	.00
6A	APPLY SAFETY PRECAUTIONS PERTAINING TO ELECTRICAL EQUIPMENT	2.	2.87	10.8	4.73
6B	TUNE AND ADJUST RECEIVER/TRANSCEIVER CONTROLS	17.	4.56	32.3	4.45
6B1	TO CALIBRATE, USING REMOTE SIGNALS OF A KNOWN FREQUENCY	0.	.00	.0	.00
6B2	ACCORDING TO DESIRED TYPE OF EMISSION	0.	.00	.0	.00
6B3	TO MAINTAIN A READABLE SIGNAL	1.	3.95	21.6	4.45
6B4	TO COUNTER THE EFFECTS OF MEACONING, INTRUSION, JAMMING OR INTERFERENCE (MIJI)	4.	3.86	16.9	5.20
6C	TUNE AND ADJUST TRANSMITTER/TRANSCEIVER CONTROLS	13.	4.73	35.3	4.48
6C1	TO THE DESIRED EMISSION	0.	.00	.0	.00
6C2	FOR APPROPRIATE OUTPUT POWER	0.	.00	.0	.00

END

10-87

DTIC